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ABSTRACT

Surveying the literature of librarianship during the 1970-74 period, this review emphasizes continuing education for medical librarians. While looking at the issue of continuing education, specific areas of need selected by medical library directors are also reviewed. The primary areas covered included: automation and computer application, non-book materials and multi-media, administration and management, information retrieval systems, and information science. Two tables predicting future job and training requirements for medical librarians and a 250-item bibliography are included. (DS)

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CONTINUING EDUCATION NEEDS OF HEALTH SCIENCES LIBRARIANS BASED ON THE STATE OF THE ART

by

ROBERT A. BERK

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CONTINUING EDUCATION NEEDS OF HEALTH SCIENCES LIBRARIANS BASED ON THE STATE OF THE ART

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Prepared for the Division of Medical Library Education
Medical Library Association

January 1975

PREFACE

Because of the short period of time in which to complete this review (three months), it was not possible for the reviewer to obtain and examine all literature identified that might be pertinent. Hopefully, what has been surveyed will provide a start and additional reviews can be undertaken to spell out specific topics that need the attention of planners for continuing education programs.

I would like to acknowledge partial support for this review provided by U.S. Public Health Service grant, Project Number LM 01857-02. All opinions expressed in this review, however, are those of the author.

R. Berk
Newport, Oregon
January 1975

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SECTION I

THE ISSUE OF CONTINUING EDUCATION

Introduction

This review presents the author's attempt to provide a rationale for what until now has been an intuitive, visceral feeling that events are moving at an unprecedented pace, and that the half life of a librarian's professional education is constantly shrinking. If the librarian is to survive, then continuing education is a crucial issue. Although a quantitative measurement of these changes is not possible, the course of change may be documented in the literature of librarianship and, particularly, that written for medical librarians.*

This review, then, is an attempt to assess these changes as reflected in the literature covered, and then relate these changes to specific areas of medical librarianship. These areas, in light of the changes that have taken place, reflect a need for continuing education for medical librarians.

The survey is limited to the literature of the past five years; i.e., 1970-74, and is the third piece in a set of reviews that began with Pendrill (1) 1961-65, and was followed by Bishop, 1965-69 (2). As in their efforts, there may be some overlap. In addition, a thorough treatment of health sciences libraries has appeared as the July 1974 issue of Library Trends (3). This last, however, instead of attempting a comprehensive review as did Pendrill and Bishop, had as its objective, the provision of an "overview of the total impact that changes have had on the traditional user services, including a final chapter projecting what the trends of the future will be to meet the needs of the health science user." (4, p.3).

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*This term is used in a generic sense to include professionals working in all types of health sciences libraries. Health sciences librarian will be used interchangeably.

With certain constraints as to the completion of such a review, the literature surveyed must reflect a subjective selection by the reviewer. In addition, while the amount of time available is finite, the volume of literature appears to be infinite. Therefore the following rules apply. I have started with the three excellent compilations mentioned earlier: Pendrill, Bishop, and LT. These cover a substantial portion of the pertinent literature published between 1961 and early 1973, although in the case of LT, earlier references may be included. For the period 1970-74, all issues of the Bulletin of the Medical Library Association (BMLA) have been analyzed and the topics represented compared with topics discussed in the other three works. In addition, a broad literature search was conducted (1970-74) in library and information science literature. From items retrieved, the reviewer has selected a few that are of interest in documenting changes that have occurred. This selection was highly subjective and the exclusion of any work from the bibliography does not in any way imply a value judgement on the merits of the work in question. Rather, it reflects the constraints of time and the author's own bias. It cannot be emphasized too strongly that beyond a close analysis of the three reviews and the last five years of BMLA, inclusion of pertinent literature was only minimally attempted.

Contrary to the approach adopted by Bishop, I have not restricted the review to the periodical literature, although it is principally that. Also some changes that appear to be important have not yet received adequate documentation in the literature sources closely analyzed, and the author has included relevant citations from sources other than "library literature" when such inclusion seemed appropriate. It will also be obvious to the reader that only the picture for the United States has been examined.

Finally, the changes that have and are occurring can be documented. As

to whether they are important, and/or lasting changes, only time will tell. Whether or not they reflect a need for continuing education is largely the interpretation of the author.

The Starting Point

Pendrill identified the following areas that characterized the period of his review:

1. The impact of MEDLARS.
2. The rise of the National Library of Medicine (NLM) as the world's most important medical library.
3. A more systematic approach to problems of library management.
4. Greater attention to co-operation between libraries.
5. The emergence of the smaller hospital and nursing libraries.
6. Various suggestions for bibliographic control in specific areas of medical literature.

These areas mark a beginning or demarcation point and the changes that characterize the last 15 years or so can be gauged from these bench marks.

Basic Assumptions

One of the basic assumptions behind this review is that areas of concern to a profession probably represent, in many cases, topics which require some type of updating in skills and knowledge on the part of the practitioner of that profession. It is further assumed that these areas will be represented in the writings of the profession under consideration and that by comparing the current output with topics previously of concern, it should be possible to pinpoint some, albeit rather broad, areas of change reflecting a need for continuing education on the part of members of the profession.

Literature of Importance to Continuing Education for Medical Librarians

The subject of continuing education is of great importance at this particular juncture in time for many professions and particularly in the medical sciences. If for no other reason, this interest in the medical

sciences would have an effect on health sciences librarians because of the information needs relating to almost any continuing education program. However, health sciences librarians are also caught up in their own information needs relating to their own profession, thereby reflecting a need for continuing education. Many writers have at times indicated what the continuing education needs of librarians might be. Some have dealt specifically with the needs of medical librarians.

For non-health sciences librarians, notable studies have been commissioned and appeared recently, or are about to appear. The study conducted by Allen (5) for the Special Libraries Association was reviewed for this study. While it is a brief summary of some of the pertinent continuing education literature for librarianship, its main thrust seems to be to present a pedagogical approach to the design and implementation of continuing education programs. Also announced as "just released" are studies on continuing education for the National Commission on Libraries and Information Science (6) and one being published by the American Society for Information Science (7). The reader is referred to the Allen study for background readings on continuing education for librarians.

In the literature of medical librarianship, several writers have discussed current and past continuing education endeavors, particularly those sponsored by the Medical Library Association (MLA). Occasionally, comments have appeared in a variety of contexts concerning these needs, often as philosophical asides.

Pendrill mentions the role of the MLA in laying "great emphasis on the need for librarians to keep their professional knowledge up to date...." and the attempts to do so through "refresher courses, seminars and workshops, providing this 'continuing education' at various levels, usually in connection

with the annual meeting." (1,p.81). He pursues this topic in a later paper presented at the Third International Congress of Medical Librarianship (8). While emphasizing the need for planning for the education of medical librarians, much of what he says applies to continuing education as well.

Other papers directly concerned with continuing education were presented at the third congress by Brodman (9), Felter (10), and Watterson (11). Felter's comments, perhaps, provide an insight to contemporary thought within the profession:

> Obsolescence is due also to changes and advances in the field that at certain points in time occur with such rapidity and in such volume that it is difficult to adjust to the new professional climate, absorb the new philosophy, and adopt the new techniques. Such a changing environment has been enveloping medical librarians in the last decade or so, and, of necessity, along with it has come the 'adaptation syndrome'--continuing education." (10,p.299).

Gartland (12) discusses the programs of the Veterans Administration and the American Hospital Association, but, in general, the reviewer classes these as in-service, rather than continuing education offerings. The Rees (13) article at the same congress, while addressing itself primarily to the basic requirements for the education of librarians relating to the first professional degree, does outline areas that may be of equal concern to those intent on developing continuing education programs. Further insight is provided by a preliminary analysis of data relating to what must be considered a major event in the continuing education program of MLA--the week long institute offered prior to the annual meeting in Denver in 1968. A complete description of these data appeared subsequently (14).

Bishop is not directly concerned with the continuing education implications reflected by the literature he surveys, although he is obviously aware of these implications. He does capsulize DuVal's remarks before the 1968 MLA meeting identifying areas of potential significance for continuing education consideration:

> He [DuVal] made a plea for more internal research on library use, advanced education in the management of scientific information, and for libraries to take an active, purveyorlike role in the dissemination of information. (2, p.48).

The LT issue, the most current expression of the state of the art, does contain comments that relate to continuing education. In a thoughtful article dealing with change in the provision of information since 1960, Darling (15) gives considerable note to the continuing education requirements by "all categories of health professionals" under the Regional Medical Program and in reports such as the Dryer (16) and Miller (17) presentations. Although directed specifically towards the medical practitioner, the indirect effect on health sciences librarians, and therefore their continuing education needs, is evident. Bearing directly on these needs is the idea reflected in Darling's prognostication for:

> The gradual conversion of the health sciences library into a communications center working actively with informational materials of all kinds, close at hand or distant, for health professions users in the community as well as in the institution (15, p.58).

Forecasting is the main concern of the Schoolman article in the same issue of LT (18):

> My prediction is simple: the next ten years will see an increasing demand for a marriage of information handling, communications technology, learning theory, educational design and educational technology in order to help the health science community respond to the demand for health services. (p.165)

For the librarian this will mean that:

> He must become a professional member of the planning and implementation team or someone else will, and then the librarian will only be an information handling technician. (p.165)

Schoolman goes on by discussing many of the areas of change which will necessitate a break from past practices, or at least the stereotypes of library practice. Foremost is an active involvement in the decision making

process behind the communication of scientific information in all media, through a variety of technologies, and in non-traditional settings. Along with responsibilities, in what for most health sciences librarians will be new endeavors, goes the need for accountability. Not in its original context of security classification, but in its current relationship to effective utilization of resources. To bring the effect of these changes down to the level of practice, Schoolman suggests that:

> The professional medical librarian of the future should operate as an integral part of the health science education team and, therefore, of the decision-making process. To prepare for this role, careful and extensive reorganization of their training needs to be undertaken. (18, p.175).

In addition to expressions of concern about preparation of health sciences librarians for new and changing roles, other reflections on the subject of continuing education have appeared in the Bulletin since the time of Bishop's survey. Brandon's (19) article was based on his Janet Doe lecture in 1969. In it he noted that "A major stumbling block in the establishing of faculty status for all medical school librarians is the inequality in capabilities, education, and productivity of existing personnel." (19, p.3). How to identify these deficiencies is an objective of this review. However, once they are identified, Brandon suggests traditional continuing education approaches:

> Within our own field, we should recognize our individual need for specialization, and through workshops, institutes, library school seminars, or graduate study seek to develop ourselves more fully to meet the academic demands of our positions. (19, p.3).

A series of articles by Kronick, Rothenberg, and Rees on their Investigation of the Educational Needs of Health Sciences Library Manpower, (20-26) often bear directly on current deficiencies of personnel in such libraries with regard to education and training. These investigators

anticipated that the data obtained would be useful in the "design and evaluation of appropriate educational programs." (20, p.8). It is assumed that such programs would not only be designed in conjunction with library schools for the professional degree program, but would also involve continuing education ventures in an attempt to upgrade the knowledge and skills of the current manpower supply:

> In other words, educational programs must be relevant to present and future demands likely to be placed on health sciences library facilities, resources, and services, and must be evaluated in terms of the diversity of institutional settings in which manpower needs now occur, and are likely to occur in the future. (20, p.8).

In the concluding article in the series, some specific areas of concern and possible remedial action are indicated. The recurring question is raised, but not adequately answered, concerning the need for substantive content knowledge for medical librarians. As so often noted, the facet concerning the cost-effectiveness analysis of library operations appears. Along with the above is the need for a greater knowledge of information storage and retrieval principles. Finally, although not the first mention, there is some attention to what has become a virtual touchstone for all who consider the current continuing education needs of health sciences librarians--the benefits and problems associated with audiovisual (nonprint) materials. Again, as so often before, the call goes out for corrective action.

This exhaustive manpower survey has provided us with a data base previously lacking. Many of our assumptions about the work force were thoroughly substantiated by this study. However, in talking of continuing education, it is the reviewer's contention that we must begin by talking about programs that <u>build on the first professional degree</u>. In this light,

we are then required to offer the same content at different levels of sophistication from the novice, to the advanced, and even theoretical student. But in all cases, such offerings are built on an assumed base of substantive subject content in library and information science (this is normally represented by the first professional library degree but may also be acquired by other means). The educational needs of others in health science libraries (beneath this substantive subject content) are also important, especially in view of the fact that so many function as health sciences librarians rather than as supportive personnel as Kronick's figures seem to indicate. (22-23). These needs are, however, usually quite different and, as this reviewer believes, of a more technical nature based on the substantive content of the professional degree program or even at the library technician level of some community college programs. Accordingly, two tracks may have to be allowed for in any effective continuing education program, with the possibility of switching from one track to another assured. But here we are talking about the track for the professional librarian (an admitted tautology).

Another Janet Doe lecturer, Darling (27) traced the history of the certification program of the MLA and its rather limited impact. Although not directly tied to continuing education requirements, the certification code did, nonetheless, involve continuing education for the advanced levels. In light of several apparent inadequacies in the existing code, an attempt to revise the certification program has been underway for several years. Although not without its heated moments, the result was the passage of a new certification code by the association's members in late 1974. The major differences between the old and new codes are that the latter now speaks directly to different certification tracks based on

pre- or post-professional degree attainment. It further insures a basic level of substantive subject content through examination. And most importantly, from the standpoint of this review, it requires an individual commitment to continuing education through a recertification requirement. This restructuring has brought the new code within the framework of the Library Education and Manpower statement adopted by the American Library Association (28) and discussed by Asheim (29).

The foregoing discussion of the profession's concern for the future of health sciences librarianship and the relationship of this future to the continuing educational requirements of the practitioners of this profession, represent only a small sample of writers who have directed their thoughts, and often their efforts, towards these considerations. Before turning to changes that have taken place within the profession over the last 15 years, it would be wise to first consider some reports that bear directly on the future knowledge and skill requirements for health science librarians.

The HUMRRO Report (30)

This report prepared for the National Library of Medicine Extramural Programs appeared in December 1973 under the title, A Forecast of Events and Conditions that Might Affect Job and Training Requirements for Medical Librarians. The report is of particular interest for a variety of reasons. One being the methodology employed in the study.

The Delphi technique of forecasting was used and the reader is referred to the report for the exact methodology. In summary, this method allows for forecasting by committee without the usual disadvantages of the committee approach. Committee members are experts who do not know other

committee members and interaction is indirect. The committee members are asked to predict the probability of an event occurring (in this case, within the next 20 years) and the probable year of occurrence. The median and upper and lower quartiles for the pooled responses of the committee members are computed by an editor who serves as an intermediary, grouping similar predictions and eliminating extraneous remarks. In future responses to possible events, estimates can be changed, but those that fall below the lower quartile or above the upper quartile for predicted date and probability of occurrence must be justified. The result of this procedure is to move the committee towards a concensus represented by the final median date and probability obtained, with the dispersion of opinion as the range between the lower and upper quartile. Responses were also weighted depending on the professional degree of expertise in any particular area offered by the respondent.

This method, developed by RAND, has been waiting for application by librarians and I, for one, am pleased to see that it has been employed in this connection.

However, before discussing the substantive content of the report, my personal reservations (biases?) need to be stated. The editor of the Delphi Committee is unknown to me, but in any case I would question some of the conclusions he elicits from his interpretation of the data. Also, the composition of the committee is somewhat questionable. It was originally comprised of 23 persons--15 of whom completed the study. The absence of any practicing medical school librarians or representatives from hospital libraries seems unfortunate. Finally, a slight cavil--if the editor, C. Dennis Fink, is going to speak so authoritatively and present such far-reaching (and often revolutionary) recommendations to the health sciences

librarians and those concerned with educating them, then it would be appropriate for him to learn the correct name of their association--not the one he gives on page 50 of the report; i.e., the American Medical Library Association.

The objectives of the study were to:

> Identify the probable developments and/or events in medicine, information science, computer technology, and so on, which probably will have an impact on the job activities of medical librarians and biomedical communication scientists.
>
> For each event, forecast the requirement for medical librarians and information scientists with respect to new skill and knowledge requirements and numbers of persons required.
>
> Suggest some of the various means by which appropriate kinds and numbers of persons can be trained for the new job requirements. (30, p.4)

Two aspects of the report will be dealt with here: (I) the forecasts concerning events pertaining to "Future Job and Training Requirements for Medical Librarians," and (II) comments from library directors regarding their suggestions for areas that should receive emphasis in programs of medical librarianship during the next ten years.*

I - Future Job and Training Requirements for Medical Librarians

Of the 95 events identified, 12 relate directly to "job duty, training and manpower requirement changes." These are given in Table 1 on page 14.

Of the 12 events, those with a high probability of occurrence by the year indicated (high equals 71% plus), are numbers 30, 62, 63, 64, 65, 66, 68, and 74. These relate to:

---

*These responses were elicited as part of a companion study to this one. See Fink, C. Dennis, "An evaluation of the National Library of Medicine (NLM) Training Grant Program," HUMRRO CR-D1-73-5, Sept. 1973.

30 - Advancement of people at the library technician level into many jobs now held by professional librarians.

62 - Subject competent librarians working in areas often referred to as documentation or information science.

63 - Health sciences subject competence.

64 - A research degree (PhD) for administrators of large libraries.

65 - Advanced specialization programs beyond the education now received.

66 - Comprehensive continuing education programs.

68 - User education in advanced theory and technology relating to information transfer.

74 - Improvements in hospital library personnel. **

** I apologise for any distortion through interpretation and/or condensation in this paraphrasing that might have occurred.

Table 1 - Job Duty, Training and Manpower Requirement Changes *

Event Number	Condition	Event Probability % **	Year of Occurrence	Range
11	Presence of a number of recognized biomedical information specialties each of which is related to a specific or small set of medical specialties.	57	1980	1977-90
30	Widespread substitution of technical-level personnel for professional librarians in health science libraries to optimize manpower utilization.	71	1980	1976-80
59	A steady increase in the supply of librarians in relation to a fairly fixed supply of jobs will result in an excess of manpower for health sciences librarians.	58	1985	1976-80
62	Medical librarians will become more like high-grade research librarians.	74	1980	1975-85
63	More emphasis on medical sociology and biological science content in programs for medical librarians.	74	1978	1976-85
64	Common acceptance of the requirement of a PhD degree to become the director of a large medical library.	71	1980	1980-80 (sic.)
65	More comprehensive and specialized training programs for health sciences librarians and other communication specialists.	81	1978	1976-80
66	Development of more extensive continuing education programs for health sciences librarians.	79	1976	1975-80

Table 1 - (Cont.)

Event Number	Condition	Event Probability %	Year of Occurrence	Range
68	Programs of library instruction will be expanded to include information/computer system, instructional technology, communication media.	78	1976	1975-79
74	There will be a widespread development and upgrading of hospital librarians.	71	1978	1976-80
76	More direct participation of information specialists in the clinical consultative process, particularly in hospital settings, as in the form of daily or periodic ward conferences.	54	1982	1980-85
94	Training programs and/or internship programs will be developed to train medical librarians to be library administrators.	66	1978	1977-78

* Compiled from data in the HUMRRO report.

** 71% plus probability of occurrence is considered "high," 31% to 70% is "moderate," and 5% to 30% is "low."

Committee members were also asked to describe the possible impact of the occurrence of each of these events. All 95 statements are of the greatest interest and should receive closer attention than it is possible to provide here. However, those relating to the previously mentioned "job duty, training and manpower requirement changes," that have a high probability of occurrence, are given in Table 2 on page 17.

I doubt that anyone would argue with the desirability of these events occurring, although the degree and year of occurrence would undoubtedly result in great difference of opinion. How these prognostications with the highest probability of occurring (an average of 3.2 years from now) relate to what might be termed the needs of the current continuing education scene may be forthcoming after reviewing other related literature on the subject.

Table 2 - High Probability Events and Their Impact on Job Duty, Training and Manpower Requirement Changes

High Probability Event Number	Condition (paraphrased)	Impact Statement (these represent a summary by the editor)	Occurrence Year
30	Advance of persons at the library technician level into many jobs now held by professional librarians.*	Librarians would be less involved with the technical operations and more involved with the training and supervision of sub-professionals. Would require more standardization of certain library operations so that they could be reliably performed by technical-level personnel	1980
62	Subject competent librarians working in areas often referred to as documentation & information science.	Would do more work as a member of a research team, especially literature searches, transformation of information (as opposed to mere item identification). Would need more content expertise and research skills. Would need some capability to screen and evaluate information. Status would be upgraded.	1980
63	Health Sciences subject competence.	Would have a better understanding of the context of medical librarianship--greater sensitivity to users and their information needs. Should be able to more effectively acquire materials and act as reference librarians. Ability to catalog medical documents should improve. Should develop increased interest in providing medical care information to the public. Might be given increased responsibility for assisting faculty in their research and curriculum planning.	1978

Table 2 - (Cont.)

High Probability Event Number	Condition (paraphrased)	Impact Statement (these represent a summary by the editor)	Occurrence Year
64	A research degree (PhD) for administrators of large libraries.	Library directors would be more involved in the educational process of their institution. They would be given a faculty position, but in turn would have to enlarge their scholarly pursuits. There would be more doctoral-level programs, with a resultant increase in the requirement for senior instructors. Many more librarians would collaborate in the planning, development, design, etc. of information systems and educational material. Would pass on their day-to-day library activities to paraprofessionals.	1980
65	Advanced specialization programs beyond the education now received.	Would result in greater involvement with educational, clinical and research activities. Might have more responsibility for continuing education programs; in turn, probably would have to enroll in continuing education programs--would have to acquire additional skills relating to educational technology, the process of communication, and so on.	1978
66	Comprehensive continuing education programs.	Participation in continuing education may become a requirement, and might serve as a basis for periodic recertification. Would need more persons to teach continuing education courses. Library schools would have to develop new programs to train persons in the "information professions". (sic) Librarians then would be able to perform many of the jobs now held by information scientists, systems analysts, and educational technologists, persons who are now taking over the "professional" activities of the librarian.	1976

Table 2 - (Cont.)

High Probability Event Number	Condition (paraphrased)	Impact Statement (these represent a summary by the editor)	Occurrence Year
68	User education in advanced theory and technology relating to information transfer.	Basic philosophy of most library schools would have to change to incorporate new technologies into their curricula. Librarians would develop an increased capacity in instructional technology and supporting communication systems. This should advance their status in the academic community and put them in a position where they could more closely cooperate with, and provide assistance to the academic faculty. Each school would have to define lines of responsibility between the library and other departments such as the Departments of Education and of Computer Sciences. Librarians would be able to assume jobs now held by persons trained in other disciplines.	1976
74	Improvements in hospital library personnel.	Medical librarians would be required to participate in a number of continuing education programs, possibly being re-certified every five years or so. Librarians, especially library directors, would participate more effectively in the operation of the medical library resources, and would have more responsibility for supporting the school's educational program. Might be more involved in the design and development of instructional material.	1978

* Compiled from the HUMRRO Report with events paraphrased.

II - Library Director Training Suggestions

In an NLM supported study, recent graduates of NLM and non-NLM supported training and internship programs were surveyed. In this study, several directors of medical libraries were asked to describe recent graduates of such programs from their own experience in terms of five areas and evaluate them in terms of skill and/or knowledge. The director could emphasize areas of deficiencies, or he could indicate areas that would require special emphasis during the next ten years. The 135 library directors provided 519 responses and these were grouped in the data presentation. Fifteen skill and/or knowledge categories were derived, and of these, the six with the highest percentages based on the responses were:

Category	Percent of responses
Automation/Computer Applications	43
Non-Book Materials/Multi-Media	42
Administration/Management	41
Information Retrieval Systems/Information Science	31
Content/Subject Matter Expertise	21
Reference/Bibliography	21

Other categories included are of interest and in many cases, appear to overlap the above areas. To be a little more precise, the following descriptions of the above categories were derived from the summary comments in this report (HUMRRO-Delphi committee). (30, p.38-9).

Automation/Computer Application responses indicated that the importance of this area to library operations was of greatest concern. As one might suspect, programming was not emphasized. This reviewer feels that this reflects the change in programming personnel availability compared to what it was in the early 1960's when libraries were first entering the age of computer applications. The ability to take a successful library application and replicate it with individual system objectives in mind seems now to be foremost in the directors' minds.

Non-Book Materials/Multi-Media responses were directed towards all aspects involved with audiovisual materials--selection, acquisition, cataloging, and housing. Although the category is called "Non-Book...", mention is made of programmed instructional texts. Of course, it is possible that such "texts" will be entirely computer-stored within the next few years. It appears that the emphasis here is primarily on the management of a multi-media resource learning center concept with a traditional library approach to software, but a technician approach to hardware. If this is accurate, then the creation and evaluation of software are noticeably missing.

Administration/Management indicates that the implementation of the LEM Statement has probably not taken place (as yet) in the medium and large size medical libraries included in the survey. Administration is not just one of several specialties that the Senior Specialist may pursue. At least at the present, it appears that the apex of the hierarchy in most medical libraries is occupied by someone primarily concerned with: (1) budgets, (2) staffing, and (3) "the incorporation of new techniques and procedures into the library setting which were not necessarily designed by librarians." (30, p.38).

Information Retrieval Systems/Information Science indicates that a distinction is being made between computer applications in the library and the broader area of computer-based information storage and retrieval applications. This is a reference to people knowledgeable as to the information environment external to the individual library and the potential of information storage and retrieval systems for effective individual library utilization.

Content/Subject Matter Expertise was a category not elaborated on and the problem here is clear even if the solution is not. The cry for subject matter competency was heard at least as far back as the Weinberg Report and may have been in practice in the Alexandrian Library during the era of Herophilus and Erasistratus. In any event, the matter is still muddled, although a purely subjective view would be that the tight job market (that is worse for many disciplines than for librarianship), is resulting in more persons with undergraduate science majors seeking education in library science and, eventually, being employed in larger medical libraries. This was not, however, reflected in the manpower study by Kronick et al:

> A large number of graduates did not have majors in either the natural or health sciences. Three-quarters of the professional librarians held bachelor's degrees in the liberal arts or social sciences.... These data have relevance to the current debate concerning the preparation of employees in health sciences libraries. (23, p.35).

This, however, does not speak specifically to the point of the educational background of employees in large and medium-size libraries, and the picture may be different or in the process of changing. But in any event, the level of subject competence from bachelor to doctorate is of greatest interest to many concerned with the provision of information to the health sciences.

Reference/Bibliography is closely related to all other categories, but probably deserves separate treatment because it is so often subsumed, when in fact it is the most important function for nearly every type of library--medical or otherwise. The respondents appear to have stressed the need for increased awareness of sources of information and subject knowledge of areas of interest. Although not stated, it would appear that

this category should also concern itself with the problems involved in bringing the information and the user together.

Other Possibilities for Emphasis in Future Education:

In the above-mentioned manpower study (20-26), personnel working in health science libraries (hospital library personnel were not included), were asked as to their preference for continuing education opportunities they would like to see offered (which is, in effect, what the library directors in the NLM study were being querried about). The responses were then correlated with the "chief librarian'" responses as to what skills relating to library work were most needed. The most frequently mentioned categories (of the 16 listed) for the nonprofessional respondents working in medical libraries were:

Category	Percentage of total votes cast
1. Reference and Other Information Services	18.6
2. Cataloging, Indexing and Classification	11.0
3. Material Selection and Acquisition	10.2
4. Data Processing Principles and Techniques	8.6
5. Circulation Techniques and Procedures	7.9
6. Interlibrary Loan	6.5

The responses of the professional librarians indicated that of the 16 categories, those considered most important were:

Category	Percentage of total votes cast
1. Reference and Other Information Services	18.0
2. Data Processing Principles and Techniques	11.7
3. Systems Analysis Techniques	10.9
4. Material Selection and Acquisition	9.1
5. MEDLARS Search Procedures	8.6
6. Cataloging, Indexing, and Classification	8.2

As the authors point out, "A major difference lies in the fact that professionals favored courses dealing with the organization of libraries,

health sciences institutions and their interrelationships, while non-professionals preferred courses dealing with the technical procedures of library operations.... The expressed preferences for specific subject topics in continuing education courses can be presumed to reflect a self-assessment of skill deficiencies." (23, p.36-7).

The work setting and context would, of course, influence this difference and the chief librarians were asked for the same type of ranking regarding needed skills. Of the 16 categories, the following received the most emphasis:

Category	Percentage of total votes cast
1. Cataloging, Indexing and Classification	18.7
2. Reference and Other Information Services	12.7
3. Data Processing Principles and Techniques	10.2
4. Systems Analysis Techniques	10.1
5. Material Selection and Acquisition	9.4
6. Scientific Terminology	8.5

The correlations employed indicated that a relatively strong relationship existed between the expressed preferences for continuing education by both professional and nonprofessional personnel when compared with skill deficiencies identified by chief librarians. The correlation for nonprofessionals was somewhat higher.

In comparison to the skill and subject areas identified in the NLM study by library directors of medium and large medical libraries, the preferences of the professional librarians are closest in accord. This would seem to indicate that the nonprofessionals expressed a preference for skills and subjects normally included as part of a master's program in librarianship. Professional librarians, on the other hand, were more concerned with matters resulting from the half life of the education received during their professional education. The chief librarians,

faced with what may be a strange "mix" of professionals and nonprofessionals in the work force, 60% and 40% respectively, (with many of the chief librarians falling into the nonprofessional category), indicated a preference which represents a combination of the important factors from both the professional and nonprofessional respondents. In other words, the chief librarians were concerned not only with the basic deficiencies due to a lack of library training, but also with the more advanced areas represented by the march of progress in the delivery of information.

It is evident, as seen in the new Certification Code recently adopted by the MLA, that two tracks of continuing education must be provided, and that the objectives of each may dovetail, but in many cases will be quite disparate.

The Profession's Stand

As well accepted as the value of the book is, is the belief in the value to be derived by an individual and society from continuing education. Such is reflected in the library profession. The Board of Directors of the MLA has accordingly adopted the position paper on continuing education of the Association of American Library Schools. (31, p.70-1).

The objectives of continuing education as set forth in this document point toward:

> ...the total improvement of the individual with specific attention to his development in the following categories; personal growth, improvement of basic professional skills, acquisition of new skills in other fields, attitudinal changes, etc. (31, p.70).

Unfortunately, "etc." is not very enlightening and the implied extension to similar categories does not make these categories clear. It is further noted that the content of such continuing education programs, ...should be

based on educational needs as expressed by the profession and take into consideration societal, professional, and individual requirements." (31, p.70), and that "...new research and developments in librarianship and related fields should be constantly incorporated into the overall program." (31, p.71). It is in this context that the remainder of this paper will attempt to identify the changes that have taken place in health sciences librarianship in the past few years. And, based on what has transpired and what is occurring, as reflected in the literature, will try to identify the forces that appear to be important determinants of any planning for continuing education.

This effort is directed principally towards the needs of the professional, although it is clear that continuing education applies to the supportive staff as well. As a paradigm for the development of a continuing education structure, the general areas receiving the greatest emphasis in the NLM study on training and internships will be used for a discussion of the state of the art as reflected in the very limited amount of material surveyed.

Finally, the total picture will be considered in light of the high probability events in the HUMRRO Report.

SECTION II

THE AREAS REFLECTING A NEED FOR CONTINUING EDUCATION

The following are possible areas for continuing education, in order of importance, as indicated by directors of medium and large medical libraries:

Category	Percent of Responses Mentioning
1. Automation/Computer Applications	43%
2. Non-Book Materials/Multi-Media	42
3. Administration/Management	41
4. Information Retrieval Systems/Information Science	31
5. Content/Subject Matter Expertise	21
6. Reference/Bibliography	21
7. Information Organization and Analysis	19
8. Analysis/Research Skills	18
9. Library Networks/Consortiums	14
10. Terminology (Medical)	13
11. Technical Services	11
12. Educational Technology	10
13. Library Services	9
14. Health Care Delivery Systems	7
15. Communication Skills	6

It is evident that without strict criteria, a given study might fall into several of these categories. In fact, many categories appear to overlap. Are "communication skills" not part of "administration?" Is the same thing not true for "analysis/research skills?" Do "Library services" not also involve "reference/bibliography" in many cases? The intent here, then, is not to quibble with the discreteness of any given area, but rather to discuss the current literature from Pendrill (1961) to the present. Each of these areas was identified by the library directors, so all are important--some, perhaps, more so than others. It is possible that the volume of literature, and therefore the extent of treatment, will

indicate a degree of importance--perhaps not. In any event, the following procedure was employed in examining the top six categories.

METHODOLOGY

In addition to an examination of the other literature previously outlined in this report, all articles published in the Bulletin for the period from January 1970 through October 1974 were input to an edge notch information retrieval system. A direct code was employed in the construction of the index for this system and the vocabulary was allowed to develop from the indexing procedure with controls imposed as the necessity arose. (See Appendix A). No claims are made for the validity of the indexing procedure, but it did accomplish its primary objective--a simple coding system allowing for coordinate searches, but emphasizing a simple, single access, subject approach to the document collection. Reliability is also questionable, but only the reviewer was involved in the process. No attempt to explain the generic-specific relationships in the vocabulary will be included, but an estimate of the depth of indexing would be 3-4 subject headings per document. In addition to approximately 230 substantive articles, many items of the "communications to the editor," "news items," etc., type were als included. Approximately one-half (45%) of the documents in the total file were not searched for purposes of this review due to the assumption that the articles dealt with subjects outside the scope of the paper; i.e., some aspect of international librarianship, or some historical treatment, etc. Many documents pertain to more than one of the subject categories to be discussed. These may or may not be treated in more than one place in this review. Some articles, while pertinent, will not be included. This may be intentional or a breakdown

in the indexing system employed. Exclusion in no way implies that a document failed to meet criteria regarding its contribution to the subject. With all of these reservations in mind, an examination of the literature may now indicate why we do or do not have a need for continuing education in health sciences librarianship.

The format of Section II will be to first present a few comments about the state of scientific communication in general, and then proceed to a discussion of the literature relating to the six categories identified through the HUMRRO Report. Then a few miscellaneous topics that deal with additional areas identified as needing emphasis in the next few years, will be discussed. Finally, a few conclusions and recommendations will be offered.

Scientific Communication - The Present and the Future

People in medical librarianship as well as elsewhere have been hearing about the "information explosion" for at least the last 20 years or so. Whether it is an explosion or not has been debated over the years. Probably Baker is correct when he notes that, "...we should all be aware by now, the information explosion was a myth. Scientific information has been growing at pretty much the same, predictable, exponential rate for several centuries." (32, p.739-42).

Pendrill discusses the problems of communication and the associated approaches to defining the problem of volume, language, and scatter as presented in what has to be considered a landmark study by Orr which appeared in Federation Proceedings in 1964 (33). The problems have remained, but not for lack of attention. A recent series of articles devoted to "Biomedical Literature and Information Services" in the same publication are concerned with matters of bibliographic control and the development of information services for those in need of biomedical

information (34-43). Recent developments with Excerpta Medica, NLM computer based services, BIOSIS, and CAS indicate that librarians must advance in their knowledge and understanding of these products and services if the most recent advances in bibliographic control and the dissemination of information are to be applied in fulfilling current information needs.

Another recurring discussion involving scientific communication is noted in Pendrill's remarks on the functions of the journal and the need for improvement in medical writing--subjects that have been with us most of this century. Solutions that have been offered range far and wide, but are well summarized by Cummings (44) and Brown (45). The solution offered by Brown (46), and Lowry (47), involving Project MERCURY at Bell Telephone Laboratories is indeed an interesting approach to the individualized packaging of information. Whether the problems of vocabulary construction for application on a national or international base could be overcome is another question.

For a thorough treatment of the problems associated with the primary journal, see the articles contained in the symposium of the American Chemical Society published in 1970 (48). If the "journal of the future" is to be the interactive terminal as part of the "work station" of the individual, as described by Herschman (49), and envisioned by Bush as long ago as 1945 (50), then librarians will have to be at the forefront of system design.

In any event, librarians will have to do considerably more in evolving imaginative approaches to the problems associated with the functions of the primary journal and the disparate information functions it attempts to perform. Flanagan, in predicting with regard to this problem,

is taken by the "a picture is worth thousands" approach: "For me the most exciting evolutionary possibilities lie in the more resourceful use of the visual image by all modes of communication. The channel to the mind represented by the visual system has a bandwidth that is far from being fully exploited." (43,p.1723). A more traditional approach involving microfilm and a two-edition system is presented by Moore (51). Again, this would involve an area of technology that is not well understood by many health sciences librarians. Kuney further elaborates on the use of compact storage microforms for the publication of supplementary material (52). For a general discussion of the subject, Veaner's book is of some value (53), and Spigai's ERIC paper (54), is also useful.

Bishop does not address himself directly to the subject of the problems associated with scientific communication. However, his review covers virtually every other aspect of the subject.

In the Library Trends issue, the subject of scientific communication still appears to be of concern. Adams underscores this point in his highly pertinent comments relating to the lack of full implementation of many, at least partial, attempts to solve the problems associated with scientific communication:

> The conservatism of the average user of scientific information and a general lack of understanding of exactly how scientific information is used are, in Sommerfield's opinion, major factors inhibiting growth of mechanized information services. (55, p.156).

Lorenzi and Young present one of the best summaries of the movement toward the incorporation of new services and new technology in the information transfer process. A useful graphic representation of the information environment, including both traditional and developing library functions, is offered and the problem summarized:

> Due to both internal and external pressure for expanded formats and sources of information, libraries are changing from a concentration on traditional methods of reference searches, interlibrary loans, etc., to new concepts that result in more effective delivery of information. Figure 1 [see page 124] represents the changing dynamics of libraries. The library is the central core, and traditional services are represented in the spokes. The arrows are pointed to new directions. Librarians must not only be ready, but must assist in the development of the new directions (56, p.123).

Darling's survey for the 1960's also speaks specifically to the governmental approach to the problems inherent in scientific communication. Her inclusion of the Weinberg and SATCOM reports; the President's Commission on Heart Disease, Cancer and Stroke; and the Medical Library Assistance Act; indicate a concern on the part of the government. This concern was later to manifest itself in the library programs associated with the Regional Medical Program; the Regional Medical Library Program; the creation of the Lister Hill Center for Biomedical Communications and the establishment of the National Medical Audiovisual Center under the National Library of Medicine; and the appearance of on-line retrieval systems perhaps best exemplified by MEDLINE (each of these topics will receive attention later in this review). As one, if not the best, person in a position based on experience and insight to speculate on the role of librarians in the future of information transfer in the health sciences, her conclusions are particularly cogent:

> The goal, as this writer interprets the signposts along the way, is the gradual conversion of the health sciences library into a communications center working actively with informational materials of all kinds, close at hand or distant, for health professions users in the community as well as in the institution. (15, p.58).

Schoolman was presented with the task of forecasting the future in his article for the Library Trends issue. His predictions appear to be based on his own experience rather than some quantitative approach such as provided by the Delphi technique. The entire article is of great interest for a

reviewer trying to identify substantive areas requiring continuing education, however, a few of his remarks seem particularly applicable in a discussion of scientific communication and its associated problems:

> Nevertheless, the changes that actually occur are much more likely to be attitudinal than operational. There will, of course, be refinements and extensions of existing methods. New and greater appeals will be made to the gods of modern technology to shore up libraries' crumbling walls (18, p.166).

> Some of the subjects that require early consideration in this dialog are: the place of the library in the organization of the institution; the impact and potential of networking; means of effectively reaching the health sciences professional community; the funding of information services; and effective liaison with other organization elements; (e.g., department of continuing education, department of biomedical communications, department of research in medical education (18, p.169).

> Librarians must orient their concerns to the educational objectives of their institutions rather than to the aggrandizement of their libraries.... The librarian must abandon the more traditional tendency of the responder to become an active advocate who can successfully compete in a world where needs always exceed resources. When the budget crunch comes, money for support of the information needs must not automatically be the first to go (18, p.166).

It is clear that since Pendrill's review, we have not solved the problems associated with scientific communication. But it is equally clear that some attempts have been made and specific aspects attacked. What the approaches to be tried in the future entail, and therefore, require continuing education for, may be inferred from the attempts that have and are being made. These are, to an extent, reflected in the literature of health sciences librarianship.

1 - Automation/Computer Applications

Without a doubt, this is an area which will continue to gain in importance in health sciences libraries as personnel costs continue to increase and the costs associated with computer use decrease through improved technology. This is already being heralded by the appearance of the mini-computer in at least one medical library.

Pendrill mentions that a number of the medical libraries in the U.S. in the early 1960's, "experimented with machine methods and several produced practical systems." Areas of involvement included serials, particularly at the Washington University, and the cooperative cataloging project at Harvard, Columbia, and Yale. His was certainly a description of the prenatal period for a child that was later to become not only a delight, but costly and even vexatious.

Bishop takes up the story of the application of the computer to library operations and covers the history and development of the Medical Library Center of New York, in which technology not only became the answer to serials control, but provided the basis for cooperation between libraries. At the national level, the computer was becoming an important tool in bibliographic control. Other areas besides serials and cataloging are reviewed as they develop, but the emphasis is definitely on batch mode operations, particularly in serials, but having moved from the experimental to the operational stage of development. Experimentation is beginning to move to an on-line mode of computer application and mention is made of the serials system being developed at the UCLA Biomedical Library employing CRT's.

By the time of the publication of the July issue of Library Trends, the patterns established earlier in both batch and on-line modes were

present in many of the larger health sciences libraries. Similar applications on a "shared" basis appear to be in the offing for both large and small health sciences libraries. In terms of their "housekeeping" applications, computers are included in the record-keeping functions described by Beatty and Beatty (57). The total acceptance of the computer concept for such activities in medical libraries seems implicit in his statement that:

> Improved keeping and availability of records is one of the major benefits that often results from automating procedures in a library. While not all libraries can answer their problems by automation, and while not all automated programs are successful, automation can produce a wide variety of records on demand. (57, p.132).

Although one does detect what might be latent "Luddite" overtones in this article, nowhere does it approach the anti-computer application for library operations school as exemplified by its chief spokesman, Ellsworth Mason (58). The urbane Mason seems to have now run his course in this vein and has been adequately answered elsewhere (59), (60).

The on-line approach to library operations that appeared experimentally at the time of the Bishop review, seemed ready to spring into maturity with brief mention in the Rogers article (61) of the MEDLARS II objectives involving the advent of SERLINE and CATLINE providing on-line serials and cataloging information through the NLM.

In terms of all the articles published yearly in library literature, the use of the computer for routine, repetitive tasks in libraries probably comprises as large a proportion of the papers as on any other subject. This is reflected in the library literature of the health sciences where a search of the 1970-74 file of the Bulletin (125 substantive articles), reveals that 9, or 7% (9/125) are directly related to the use of the computer in library

operations (the use of the computer relative to information services will be discussed in Topic 4).

A plethora of articles has been spawned by the imagination of one of the few "seers" in health sciences librarianship, and continues with oracles generated by a seemingly endless stream of "trainees." Thus we find numbers 9 through 14 in the series devoted to the medium-size medical library emanating from Washington University School of Medicine Library. These represent research into various areas of library automation. Beckwith's study of the holdings statements used in PHILSOM and the frequency of updating indicate that due to the number of titles that remain constant (primarily dead titles), a division of the live from the dead ones might be feasible, with more frequent updating possible of those that do change. (62, p.120-125). Although no direct application is described, an interesting comparison of compression codes for bibliographic retrieval is described by Coe (63). Two articles were devoted to SDI services. The one by Miller (64) compared a manual and a computer based commercial system in terms of recall and precision. As found so often, the amount of overlap in which each of the two systems identifies a common group of documents was relatively small (16%) which appears to be the major problem, not the means of manipulating a file. The other article, not by a trainee, but by Ohta and Evans (65), was devoted to the description of an experimental SDI system tied to the personal file index which seems to be a direct descendent of the work of Jahoda at FSU. Although not central to this study, the implicit significance underlying access to personal file information (including all materials, not just document input from the SDI system) is communal sharing of <u>all</u> sources of information. Perhaps

this is a fantasy in an environment that generates rewards on an individual basis. Other SDI systems will be discussed in other sections of this paper.

Howard and Kharibian team up in a study of the possible standardization of a system to provide monograph control as an example of a modular approach to system design. The potential for the homogeneous aspects of hospital and other similarly related health sciences libraries operation is clear (66). Fenske's study of the correlation between classification numbers and subject headings indicates that based on accuracy, "going from subject heading to classification number would be better than going from classification number to subject heading...." (67, p.323). The value of working from MeSH annotated with classification numbers is pointed out.

Other medical school libraries are also investigating the application of the computer with Lemkau and Straub describing an automated serials control system based, to an extent, on the system developed by the Medical Library Center of New York (68). Love and others (69), describe a systems approach to providing on-line machine readable records through the use of an MTST system in a reclassification project. The potential for future applications from a computer-based bibliographic record of the library's holdings is emphasized.

The importance of the monograph collection and the value of the computer in providing access and control are discussed by Kock and Kovacs (70). The use of a commercial firm for computer time and the design capabilities of off- and on-line operation make this an interesting local networking possibility when compared to a rapidly expanding system such as that offered by the Ohio College Library Center.

Much literature of interest to health sciences librarians with regard to the application of the computer to library operations is presented

throughout the literature of library science. For an excellent survey see Kilgour (70a). The importance of OCLC either as something approaching a national bibliographic center for processing of MARC tapes, original cataloging, and union catalog functions for interlibrary loan, or as a prototype for the regionalization of bibliographic centers, cannot be denied. The relationship of such a system to the MEDLARS II CATLINE function is being evaluated by many health sciences librarians today (71). A good description of the OCLC operation is available in LRTS (72).

Other publications not available at the time of the Bishop survey include the Proceedings of the Third International Congress of Medical Librarianship. Several articles by U.S. participants are of interest. Kilgour (73) discusses standardization and the MARC II format, while Rees (74), views the same format for application in a union list of serials. Divett (75) and others discuss the file access points for an automated library catalog, in which a modular entry approach was designed. A well-illustrated approach including search logic is presented.

Another area of interest for health sciences librarians is non-computer tied automation. Advances are being made in work simplification and methods improvement in a variety of libraries, but are not always original or extensive enough to find their way into the literature. Depending on one's definition of "automation" (here it means a combination of human, mechanical, and financial resources to improve the efficiency, productivity, and user benefits of some library operation), other developments come into play. Reprography involving current technologies is such an area, and the controversy regarding copyright has flared from the period covered by Bishop to the present. For a chronicle of events see "News Items" in the Bulletin (76-80), and MLA News (81-82). The whole question may be

academic if Xerox is successful in marketing their new process that prevents copying xerographically (83).

Telefacsimile reproduction of graphic materials seems to be in a state of limbo awaiting the advent of the technology which will provide a considerably greater speed for the reproduction process--probably something on the order of a standard photocopy machine--if its full potential is to be utilized. Its availability for some of the functions now performed by the TWX may be making inroads in health sciences libraries, but no mention was found in the literature.

One of the more interesting uses of automated procedures was described for the Health Sciences Library at Ohio State University (84). The automatic bookstack system certainly borders on the revolutionary, and when tied to the computerized circulation system, appears to solve many of the problems faced by all types of libraries, while at the same time, I suspect, will create a few more.

Two additional "News Items" in the Bulletin appear to herald the future of computerized library applications, and indeed, are a reality for some libraries. One is news of the on-line serials control system developed at the UCLA Biomedical Library (85). Unfortunately nothing has appeared in the Bulletin subsequently describing the system in detail, although a paper was presented at the Proceedings of the 1972 Clinic on Library Applications of Data Processing (86). The other concerns the plans of the Bio-Medical Library of the University of Minnesota to develop a mini-computer system.

The movement towards this type of CPU and the mini-computer concept, while slow in being applied to library operations, is definitely one that holds great possibilities. Its advent into a total systems approach has been planned for and although still experimental, is rapidly moving to an

operational stage in at least this one health sciences library. The potential for replication at other health sciences libraries and its great advantages in cost and ownership (and therefore library control) over general purpose digital computers, argues well for continuing education for knowledge's sake, but also to foster, if not change, attitudes that objectively evaluate "machines" in light of cost/benefit criteria. Several articles on the Minnesota experience will be in the forthcoming Proceedings of the 1974 Clinic on Library Applications of Data Processing, University of Illinois. These include one by the project director (87), and the others by the people involved in designing and implementing the system (88), (89).

Summary

Interest in the application of automation and particularly the use of the computer in health sciences libraries, does not seem to be waning. Several important changes appear to have transpired during the period since Bishop's review. There is a general acceptance that for some libraries the computer works, and works effectively, despite the views of Mason. For some there is an understanding that on-line applications are not unique, but are the natural extension of the batch mode given the advances in computer technology. More of the research such as that emanating from St. Louis needs to continue, and there is a definite need for someone to synthesize knowledge relating to what has been accomplished in health sciences libraries involving the use of the computer. This could, in itself, be the background for creation of a continuing education effort in this important area. Perhaps a monograph or programmed text on this subject could be supported. This should be in much greater detail than currently available, and with an emphasis on application or adaptation in health sciences libraries.

Finally, the advent of the micro-processor and mini-computer should be watched carefully and incorporated into the knowledge base of health sciences librarians. It is probably not fanciful to predict that these will be constant companions in our daily lives before long. This will involve not only the one monitoring the operation of your car, the appliances in your home, the balance in your charge account vis-a-vis your checking account, etc., but also the routine, repetitive operations of the health sciences library.

2 - Non-Book Materials/Multi-Media

Microforms have already been mentioned briefly in this review and their apparent importance indicated. Accordingly, the knowledge of health sciences librarians must include software and hardware requirements of materials in these forms. In addition, this section will deal with audiovisual materials which involve audio and videotapes, slides, films, pictures, models, and the use of learning machines; i.e., computer assisted instruction (CAI).

Although health sciences librarians have been frontiersmen in pioneering many of the advances that have taken place in librarianship over the past 100 years, this has not been one of those areas. Of course, many health sciences libraries have flirted with slides, films, and Audio-Digest tapes. Some have provided, or at least housed, the materials required for instruction in radiology. Others have gone into the artifact business to the extent that George Washington's denture may be a part of the collection, although its informational value may not always be clear. But being relatively untouched by the cataclysm initiated by Sputnik, health sciences libraries did not come into the NDEA largesse that was responsible for school libraries becoming the avowed disciples of media. It appears that we may now rapidly make up for lost time in the health sciences.

Pendrill notes that for the period of his survey, the traditional emphasis on films, slides, and audiotapes is evident, and in the latter case, "The uses of tape may extend to the visual field with the introduction of videotape recorders." (1, p.90). Most important is Pendrill's observation concerning the integration of audiovisual materials into the health sciences library:

> Whether or not such materials should be the responsibility of the medical librarian is still an open question. The prudent

> librarian will see to it that he keeps himself informed of current developments and is in a position to offer guidance if it is requested (1, p.90).

Therefore, up to 1965, the concept of audiovisual materials as important materials useful in achieving the objectives of the health sciences library was in doubt.

Bishop, covering the literature through 1969, has a short section devoted to the "newer media." He notes that:

> There is much activity in medical libraries involving the 'newer media': audiotapes, films and film cassettes, videotapes, etc. This is particularly true in libraries supporting nursing education programs and in some of the medical school libraries, particularly the newer ones. Medical librarians, however, seem to be busier dealing with these things than writing about them. (2, p.86).

If Bishop is correct, then his warning was virtually the calm before the storm. From many aspects, it appears that it is the issues in this area that may decide the future of health sciences libraries in the educational and informational arenas. Bishop warns:

> The 'newer media' are a small but growing force in health sciences education and practice. Their place in the scheme of things in a medical library cannot be ignored (2, p.88).

How fast are the winds of change blowing? Bishop could find nothing relating the library to computer assisted instruction for inclusion in his review.

Beatty, too, notes that the newer medical school libraries are being designed for different media utilization. If anything, he underscores the lack of data relating to the use and value of such non-book materials and paraphrases (unintentionally) Bishop's warning:

> Medical librarians have important roles to play in both areas, but little has appeared from them in the literature. Active investigation, promotion, and advice leading to improvements are vital steps to be taken (57, p.131).

Many items in Schoolman's article point to a merging of all media approaches with a potential for achieving educational and informational objectives.

> In various areas of health science education sufficient pressure is developing to demand support and recognition for reorganization and synthesis of biomedical information. This new literature must be effectively accommodated. To do this requires the contributions of many elements of the health science community. That these will respond is illustrated by the developing coordinated program on multi-media education resources (18, p.170).

> There is also a changing philosophy of health science education. The former concern with the acquisition of facts is being replaced with a growing concern for the ability to synthesize information and use it for problem-solving.... Thus, the professional librarian must now acquire an appreciation of learning theory and an understanding of what health science educators are trying to accomplish. (18, p.169).

This latter concept relates directly to the idea behind the impact being made by CAI programs. But it also seems to indicate the "richness" that attainment of educational objectives entails involving for the librarian the necessity and ability to bring a variety of media to bear on the problem and adaptation based on meaningful evaluation. As a result:

> Libraries will have to handle technically more information packaged in an increasing number of formats. To this indispensable function will be added increasing demands in support of educational objectives. The education and experience of the librarian must be expanded to meet this new role. He must become a professional member of the planning and implementation team or someone else will, and then the librarian will only be an information handling technician (18, p.165).

Are health sciences librarians aware of what appears to be happening involving non-print media, and more importantly the questioning of basic assumptions about books and learning? The literature of the profession should provide this answer. The Bulletin edge notch file was searched under the following headings: Audiovisual, AVLINE, Lister Hill BCN, NMAC, and Programmed Instruction. In most cases, some retrieval was provided.

Audiovisual

Lieberman's article in 1972 discusses one of the new media that may have a tremendous impact on the educational process and, therefore, health sciences libraries--the videorecord. This is a generic term encompassing the more commonly used term--videotape. His advice to librarians is to be echoed time and time again by others concerned with the packaging of information:

> It would appear timely for the medical library community to consider all existing methods of information dissemination with special regard for economy and effectiveness. (90, p.25).

A series of articles appearing to be highly significant comprises the Alabama Journal of Medical Sciences for April 1970. This issue is devoted to the Proceedings of a National Conference on the Use of Audiovisuals in Medical Education. It was not possible to obtain the issue for this review.

PAIR stands for Pontiac Area Instructional Resources group, and Closurdo and Pehkonen detail the plan of this group to provide a forum for consideration of the issues of software and hardware, sharing of same, and the production of such materials. In light of the cost of producing and acquiring software and hardware associated with audiovisual media, such a cooperative venture will be required. The key, of course, is cooperation and it appears that PAIR has been able to get it all together (91).

Films are still popular and will probably be with us for a long time. The traditional approach to audiovisual materials certainly centered on this medium and for such an approach the reader is referred to Crawford's chapter in the Handbook (92). The value of employing this medium to obtain library objectives and some of the problems associated with a film program are discussed in an interesting article by Meiboom (93).

For a discussion of the philosophical question of a "bookman" confronting these newer media which he knows are important (but have not yet fully proven themselves) and recognizing (at least implicitly) that they may spell his doom should he misjudge their importance, see Kronick (94). Judging from the pressures being applied from media sectors and the dearth of literature on the subject published by health sciences librarians, Kronick may be correct in his estimation that:

> In the field of health science librarianship I feel we have only begun to become aware of these problems and that strides toward solving them are called for.

And prophetically:

> If the integration of print and nonprint material into a single information resource is to take place, as I hope it will, it will have to be as the result of a close collaboration between the media and information specialists (94, p.24).

As pointed out by virtually all authors of documents dealing with non-print materials, an area of major concern involves the use of microforms. Instead of being heralded as an innovative approach to attaining learning objectives (which it is not), it is often offered as a deterrent to these very objectives because of the hardware required for use of this medium. This is also true for the other newer media but in many cases the material is not available in any other medium, and the hardware, while a nuisance, does not involve a choice. For someone interested in microforms, many articles are readily available in the literature generally and apply to health science libraries as well. As a sample, the reader might investigate those in the ACS Microfilm Forum (95), the article by Sullivan (96) for vocabulary and acquisition aspects, and Hawkins (97).

Computer Assisted Instruction

Bishop found "No literature...relating the medical library to programs of computer-aided instruction, although some such relationships exist." (2, p.88).

A substantive and highly informative article by Smith appeared in the Bulletin. Her thorough treatment again points out the measurement of educational objectives that must be forthcoming:

> Definitive conclusions on cost effectiveness can only be made after more extensive trials and evaluations have been made than have been possible during the research and development process which has taken place over the last few years (98, p.17).

What effect CAI will have on health sciences librarians is not yet known, but as Smith points out, CAI may be a part of the librarian's own education in the search for greater competence.

The appearance of CAI in health sciences libraries was reflected in a 1972 experiment involving the NLM and the provision of CAI via the Tymshare network (99). Additional CAI instruction became available with the addition of Ohio State University College of Medicine. Teaching materials developed in their independent study program are:

> "organized into instructional units or modules which the student completes through use of audiovisual aids, computer-assisted tutoring, and printed materials. It enables the student to advance at his own pace through the first fifteen months of medical school." (100, p.76).

Massachusetts General Hospital signed a contract with the NLM to make CAI available to other institutions. The materials of this institution may also be useful for a continuing education program by, "simulating disease syndromes, biomedical models and clinical encounters on the computer." (101, p.78). Also added to the network was the computer center of the University of Illinois Medical Center (102). For a brief, but valuable, survey of the use of CAI in the health sciences, see Brigham and Kamp (103).

How all of this will affect health sciences libraries is unknown. That terminals for access to CAI have to be housed is evident. For many of the older schools and those unable to undertake construction to provide students with a complete resource carrell configuration, the library with

its long hours of operation will probably be called on for this "warehousing" function. However, it begs the point that this function need not be passive. As with the approach taken at Ohio State, all resources capable of aiding in the attainment of the educational objectives should be brought to bear on the learning process. Many of these resources are now and will continue to be the variety of media acquired, organized, and disseminated by health science libraries. It is here that the librarian must become a member of the educational team by working with others in bringing the resources of the library into contact with the programs offered by CAI. With the advent of an evaluation system for audiovisual materials, some of the problems facing both librarians and health educators may be reduced, while the value of these materials is increased.

National Medical Audiovisual Center

With the transfer of NMAC to NLM in July of 1967, administrative integration of a variety of print and non-print media was accomplished to meet the information needs of the health sciences community. Ripples resulting from this splice have not received a great deal of publicity, but they are present. For example, a Health Sciences Audiovisual Group was formed and had its first meeting in San Antonio in 1974. A popular feature of the newly formatted MLA News is devoted to "Media Notes." Resource persons are being trained for each of the eleven regions of the Regional Medical Library Program by NMAC. A new section was formed within the Health Sciences Communication Association (HeSCA) called the Biomedical Libraries Section. And finally, the planned AVLINE operation within NMAC has direct bearing on the recommendations concerning multimedia in the 1971 report of the Association of American Medical Colleges on the "needs in biomedical education which might be served by a biomedical communications

network...." (104, p.1). The first three recommendations on multimedia seem especially important here:

> 5.1 The National Library of Medicine through its National Medical Audiovisual Center should accept the national responsibility for indexing and cataloging nonprint media pertinent to all health sciences, using the familiar Medical Subject Headings (MeSH) of the Index Medicus.
>
> 5.2 Storage of multimedia citations in a computer-based MEDLARS retrieval system should permit the following: (a) demand searches to retrieve a working list on any topic or area; (b) recurrent content-oriented listings in specific subjects and for various disciplines at specified intervals; and (c) an inclusive annual listing similar to the Cumulative Index Medicus, including enough descriptors to locate the materials.
>
> 5.3 In addition, an annotated listing or catalog should be issued regularly describing available audiovisuals evaluated and selected by qualified educators from either the content advisory groups, professional societies, or scholars-in-residence, using some established minimum standards of quality. Content, educational objectives, audience level, media, software format, source and availability, running time, cost, and author should be described. This publication should serve the same function for those seeking nonprint material that the Abridged Index Medicus now offers physicians seeking clinical information. (104, p.57).

Unfortunately, not much has found its way into the literature reaching most health science librarians. In the July issue of Library Trends, Schoolman does indicate that plans are developing:

> In various areas of health science education sufficient pressure is developing to demand support and recognition for reorganization and synthesis of biomedical information. This new literature must be effectively accommodated. To do this requires the contributions of many elements of the health science community. That these will respond is illustrated by the developing coordinated program on multimedia education resources.
>
> At the moment, this arena can be succinctly described as chaos. No real discipline exists in production, editorial review, indexing, cataloging, storage, retrieval or distribution. The chaos of the software aspect is matched in hardware where a rapidly changing, highly competitive technology has led to an almost total lack of standardization and convertibility.
>
> The NLM, in collaboration with the Association of American Medical Colleges and the American Association of Dental Schools, has begun a comprehensive program to attempt to bring order out of at least

> a small segment of this chaos. This program represents a collaboration between federal agencies (NLM, Bureau of Health Resources Development, VA and the Armed Forces) medical and dental schools, professional societies, hospital educators and medical librarians. This base will eventually be expanded, but in the beginning it was necessary to limit the program to a size on which the available resources might have a discernible impact. The AAMC and the AADS are acting as a managerial focal point for the academic and professional health science community, while the NLM is serving a similar function for federal agencies. This program is pursuing the development of a comprehensive review process for audiovisual materials. In addition, with the help of several hundred potential users and many medical librarians, a computerized, searchable retrieval system is being developed. The review system is already operating, and the bibliographic control system will be operational in 1975. (20, p.170-71).

It is evident that the availability of on-line bibliographic control for critically evaluated audiovisual materials will eliminate many of the problems now faced by medical educators and librarians. However, the value to be gained by the process is offset somewhat by the cost and inherent delay built into the system. I have not seen any mention of AVLINE in recent issues of Library Network/MEDLARS Technical Bulletin. This is a source not cited in this review due to its unavailability to many health sciences librarians who are not MEDLINE users--a circumstance that is highly regrettable, but (based on a personal communication) financially necessary. This publication in itself provides a possibility for continuing education for many of the librarians of smaller institutions who can least afford financially to take advantage of resources such as those offered by MEDLARS II. The program has received some mention in NLM News. A brief discussion of the collaborative program between NLM, AAMC, and the AADS is outlined. It indicates that some 2,400 items will have been reviewed by June 1974.

In any event, NMAC is reaching out to the library community. One example (as noted by Bishop) is their willingness to duplicate without

charge any of their videotape holdings. Another is their training programs; and yet another is the cooperative venture with the Bureau of Health Manpower Education to establish an Office of Audiovisual Educational Development, to stimulate the development and use of new audiovisual techniques in the education of health professionals. With a multimedia approach to the provision of information in the health sciences, the need for a structure or a plan for a biomedical communications network becomes even more important.

Lister Hill National Center for Biomedical Communications

The Lister Hill Center was established on August 3, 1968. "Its missions to develop networks and information systems to improve health education, medical research, and delivery of health services" were identified in a memorandum from the Secretary of Health, Education, and Welfare in announcing the establishment of the Lister Hill Center (104). This is found in an extensive report by the AAMC and deserves the careful attention of all health sciences librarians. It has been interpreted by Smythe in another important publication of concern to health sciences librarians (105).

Bishop discusses the role of the Lister Hill Center in a biomedical communications network and remarks on the possible affect of such a network:

> The National Library of Medicine will certainly never be the same if the BCN comes to pass, and having the 'library component' as only one of five will result in a national medical 'library' such as has never been seen before (2, p.55).

But yet, here we are moving rapidly in that direction. And isn't it precisely for these reasons that the crisis in continuing education is so great. Half life may come to be measured in months instead of years if something is not done at both the basic professional and continuing education levels of education. Bishop expresses some doubt about many of —

the projects getting a high national priority and he may be right, expecially in light of the recent "ingression" or "reflation" economic picture. The objectives of the Lister Hill Center are offered by Bishop based on Davis' article and are:

1. To be a focal point in the Department of Health, Education and Welfare for biomedical communications systems.
2. To apply existing and advanced technology to improving biomedical communication.
3. To design, develop, implement, and provide technical management of a Biomedical Communications Network (2, p.56).

Progress along these lines appears in the Library Trends issue where Lorenzi's catholic approach to her topic provides many valuable insights. In speaking of the various components of the BCN she notes directions that are being pursued. She speaks of NMAC's mandate to "improve the quality and use of biomedical audiovisuals in health professional schools." (56, p.120). The vertical approach in which a learning resource center such as a library has no production capabilities for audiovisual materials but does participate in the "design, evaluation and selection, support and supply, and utilization and dissemination...." (56, p.120) is discussed, and the use of satellites by NLM and the advent of cable television for use in a BCN are also noted. The satellite innovation can be found discussed in NLM News (106-111). That all of this portends change for health sciences librarians and, accordingly, need for new skills and knowledge, seems embodied in Lorenzi's statement that:

> Their [Lister Hill] long-term objective will not be limited to improving existing systems but will include devising newer systems using a different mix of men and machines than now familiar (56, p.124).

For an understanding of developments leading up to the passage of PL 90-456 establishing the Lister Hill National Center for Biomedical Communications, see Darling (15).

Several substantive articles on the BCN have appeared in the Bulletin since the time period covered by Bishop. In 1970, the Deputy Director of the Lister Hill Center, Davis McCarn, described the developing on-line information system and the alternatives considered (112). Based on an analysis of these alternatives, the use of System Development Corporation for an experimental service based on Abridged Index Medicus was contracted for. The result of this experiment is, or course, familiar to us all and received the attention of that able evaluator of the MEDLARS Demand Search System, F. W. Lancaster (113). From this beginning, to achieve objective number 2 above, we have now moved on to MEDLARS II with Elhill 3 and are virtually inundated with on-line bibliographic data bases. More on this subject in Topic 4.

Perhaps in answer to Bishop's earlier criticism, Davis presents a detailed discussion of the concept of a National Biomedical Communications Network in the Bulletin (114). Close attention to this article is important for anyone who hopes to understand the background of the subject and the possibilities available in the organization of the basic components into a network. An interesting discussion of the problems and validity of measuring the cost/benefit for a BCN is included which recognizes the primary difficulty:

> Recognized or expected improvements in quality of health services are not readily translated into cost benefits. The results of changes in quality of health services demand measurements on the patient population which are generally statistical in nature and thus long-term. No predictive techniques in this regard appear applicable because of the lack of usable patient or medical records (114, p.15).

As a result:

> In planning networks there is an hypothesis--in many cases proved--that communication services are the most effective means for joining customers to information where effectiveness is measured against established criteria (114, p.19).

The article by Schoolman in the Bulletin discusses the role of the Regional Medical Library Program in the development of a BCN (115). In speaking of the need for resources and facilities in this development, Schoolman makes the point that in light of NLM's Policy Statement on the RMLP, an important issue is that:

> No matter how organized, the program makes immediate demands for resources and facilities, for the establishment of priorities and, therefore, for specific commitments. These commitments are neither insignificant nor transient, and if made will undoubtedly influence institutions' orientation. It is our belief that in the long run the institutional objectives will also be better served; they will gain more than they give up (115, p.284).

Some very basic issues are being raised at this point, and a careful reading of Pings' article (116) may help to clarify just what the possible effects of such a commitment to a BCN might entail.

And finally, what the implications of such planning are for the basic unit in the BCN and the possibility of different configurations are considered in a recent article by Fink and others in which consortia serve as a cooperative approach (117).

Summary

Four rather broad and very complex topics have been introduced in this section on Non-Book Materials/Multi-Media: Audiovisuals, CAI, NMAC, and the Lister Hill Center for a BCN. In almost every instance, innovation and change have taken place since Bishop's review. Further, what literature is available is widely scattered and very incomplete. In the audiovisual area alone there is a felt need for a detailed and documented manual relating software and hardware to the library functions of selection, acquisition, processing, housing, and dissemination in health sciences libraries. In this area health sciences librarians are generally in a

position of playing "catch-up." NMAC will have to play an important consulting role in the process and serve as the focal point in the BCN for these materials.

CAI appears to be the answer to many problems facing education in general: (1) find an educational mode that actively involves the learner in the learning process, (2) provide for individualized instruction so that a student may proceed at his own pace, (3) replace the instructor as lecturer to a sea of faces with a one-to-one relationship, while at the same time educating more students, and (4) devise more objective and meaningful evaluations of the learning process. CAI may not be the answer, but until it has been proven or disproven, it will become increasingly available. If the library is to do more than house the machines, then the librarian will have to become directly concerned with attaining educational objectives and focus the resources of the library on support of instruction by this new mode.

Finally, the BCN is developing and with it the new switching technologies for information transfer. Few health sciences librarians will need the technician's knowledge regarding cable TV, telefacsimile, iterative information systems, and communication satellites, but a knowledge of the software and hardware possibilities and limitations and an understanding of the part played by these technologies in a BCN will be essential. Library schools are viewing these changes in light of the curriculum, but for those currently faced with these dimensions of communication in health sciences libraries, the need for continuing education seems obvious.

3 - Administration/Management

This is another of the more important areas identified by library directors in the NLM training and internship study and reported in the HUMRRO Report (30). Some distinctions may be necessary before looking at related literature. For this reviewer, administration means seeing that the work of the organization accomplishes the objectives of the organization in the most efficient and beneficial manner possible. Management is usually a synonymous term except when supervision is implied, which is directly involved with seeing that the work gets done. Several topics appear pertinent to this discussion, and these may be divided into two broad, overlapping categories: (1) personnel administration and (2) scientific management.

Pendrill begins his review with a statement about library management becoming more systematic in its approach--possibly necessitated by the advent of the computer age in libraries. Bishop, however, debates the point. The LT issue does not concern itself with the subject, but Schoolman does have some advice to offer:

> When the budget crunch comes, money for support of information needs must not automatically be the first to go. To perform this important function, librarians must accept an additional and burdensome responsibility--accountability. Accountability implies effective utilization of resources. In today's world efficiency is a prerequisite to effectiveness (18, p.166-67).

Personnel Administration

In the Bulletin, Darling's article on the subject is interesting for its cogent comments and also for its uniqueness (118). From the dearth of articles devoted to this subject, one would think that machines were performing all library operations.

The topic is of great importance to all libraries. It is generally realized that human resources are the most important of all those a

library possesses, and as a result, they take up a proportionally large share of the budget. Because of this realization, staff development has become an increasingly important topic and is the principal reason for this review. Add to this an increased awareness of the purpose of "work" in the context of individual worth, human relations, and interpersonal dynamics, and you have a picture of personnel administration that is constantly changing.

The work of McGregor on Management by Objectives (MBO), should be familiar to many health sciences librarians (119). A good treatment of MBO can be found in the book by Carroll and Tosi (120). Also of value are many books and articles on Management. The following might be investigated: 1 - Management Education Conference (121); 2 - Johnson's article (122); 3 - a useful bibliography on management literature (123). For the reviewer, there are at least three components to the successful application of MBO in a health sciences library:

1. An effective plan of personnel development based on the goals of the organization and the goals of the individual, must be developed and the criteria for evaluation clearly defined. Feedback and evaluation must be formalized and performed periodically.

2. There must be a goal-oriented (individual and organizational) means of personnel evaluation to provide adjustment and feedback not tied to advancement, demotion, etc.

3. There must be a mechanism for participatory management so that those directly affected by the decision-making process have a part in this process.

The very difficult task of effecting change or organization development (OD) will not be discussed here, but a few sources of information relative to

the above topics will be indicated.

Personnel Development - The matter of personnel development, or continuing education as one of its major components is commonly called, is being treated extensively. Elizabeth Stone is the acknowledged spokesperson, and a worthwhile collection of articles appeared under her name in the July 1971 issue of Library Trends (124), and in the ALA publication on New Directions in Staff Development (125).

Personal Goals and Organizational Goals - Tying personal goals to organizational goals is perhaps the most difficult aspect of MBO and continuing education is perhaps the easiest approach. However, the work of the individual involves a proportionately large part of his life and the result of a Frederick Taylor approach to specialization can cause far reaching organizational problems. An introduction to this subject may be found in a book by Myers (126), which concentrates on more meaningful work through job enrichment.

Another aspect of this second component of MBO has to do with evaluation, and a sufficient number of these articles have appeared in recent library literature. Those by Renfro (127), Johnson (128), Peele (129), and Yeh (130), appear to be representative. Of equal interest are those often found in the Harvard Business Review, notably the one by Levinson (131), which points out that there is still the matter of "honesty"--even MBO can be manipulative and management-oriented if misdirected.

Participatory Management - It is in this area that Marchant (132), has made a name for himself with regard to the application of Rensis Likert's work to libraries. What mechanism to employ is debatable, but the article by Kaplan (133), on participation in academic settings and the one by

Howard on an orbital organization plan are thought provoking and worth discussing (134).

Of equal importance to human resources are the financial resources of the library. These two come together in the policies, procedures, and methods that lead to the attainment of the library's goals. The measurement of such goal attainment, in many cases, lends itself to a quantitative approach.

Scientific Management

Scientific Management has regained a degree of acceptability in library management circles today despite the misunderstandings and misapplications in the first half of this century. It now involves not only the scientific approach of observation, measurement, and experimentation to management, but it also includes the affect of this approach on the human resources of the library, and an acknowledgement of the benefit side of the cost/effectiveness coin--a side that cannot in many cases be quantified.

Several articles are of interest; notable is the one by Heinritz (135) which indicates the usefulness of numerical methods as part of the planning process in the consideration of alternatives. The lack of such quantitative ability on the part of most people entering librarianship seems to clearly indicate that a continuing education effort must be directed toward this most important aspect of accountability. For an extension of the numerical approach, see also DeProspo and Altman (136). The position of an administrative specialist along these lines is built into the LEM statement, and Smith (137), is voicing this same concern when he concludes that libraries do need managers. However, the day when an MLS and an MBA,

or some other useful combination, meet in enough individuals to supply our current needs, is undoubtedly a long way off. It appears to this reviewer that even a "humanities" major can be convinced of the importance of scientific management and be introduced to suitable quantitative techniques (although it is not always an easy matter).

Budgeting - This is one area that influences every aspect of library operation, and there is much to be learned by health sciences librarians even though budgeting is a unique practice developed by each individual institution. It is, nevertheless, possible to speak of and instruct people in generic types of budgeting, such as line-item, object, performance, and Planning Programming Budgeting System (PPBS). The latter has captured the fancy of many librarians today and the literature reflects this. Articles by Summers (138), Jenkins (139), Fazar (140), Howard (141), and Tudor (142), all reflect this surge of interest.

Application of Scientific Management - The result of this return to respectability for scientific management has been a noticeable change in the nature of many articles appearing in library literature. The desire for accountability has led to a plethora of titles such as: 1 - "The formula approach to the library size," (143); 2 - "SCOPE: A cost analysis of an automated serials record system," (144); 3 - "A cost effectiveness model for comparing various circulation systems," (145); 4 - "An approach to the measurement of use and cost of a large academic research library system," (146); 5 - "A cost-benefit analysis for determining the value of an electronic security system." (147). For a compilation on cost reduction, see the recent work by ASIS (148), and the literature review by Wilson (149). The extension of this quantitative approach to its highest degree of refinement has introduced the term "operations research" to the library profession.

Operations Research

Definitions for the field of combined techniques which comprise operations research (O.R.) vary largely because of O.R.'s wide applicability to a variety of problems, in a variety of disciplines involving decision making. One definition offered by Morse is "'a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control.'" (150, p.1). For an application of this approach, see Morse's book on Library Effectiveness (151). In light of the above definition, the difference between operations research and many other quantitative approaches is the degree of sophistication involved--or the difference between the application of the "garden-variety" mathematics versus higher mathematics. That O.R. is here to stay is evident from library literature and as an introduction to planning for appropriate continuing education programs, see the January 1972 issue of Library Quarterly devoted to Operations Research: Implications for Libraries. (152).

The Literature of Medical Librarianship

Despite the lack of references treating personnel administration, there are several that deal with some aspect of what might be called a scientific management approach to library operations.

A useful review and bibliography on measuring library effectiveness was published by Evans and others (153), and commented on in a following letter (154).

The series of articles by Orr and others on the "development of methodologic tools for planning and managing library services," overlaps the period covered by this and the Bishop review. The provision of the

bibliography in part IV (155), coupled with the one by Evans should be of benefit to health sciences librarians. The articles on the development of measurement techniques represent the best effort to date at quantifying library operations as indirect measures of effective performance, and patron benefits. The long and detailed report by Orr and Schless (156), on the result of a survey employing standardized tests should be studied by all medical librarians and the data incorporated into a serious effort in establishing performance criteria for major biomedical libraries. Huntley's article provides a much less sophisticated approach in the evaluation process for hospital libraries (157).

Budgeting - The fallout from PPBS does not seem to have blanketed the health sciences library world. Or if it has, no one has wanted to discuss it in the literature. Although not directly concerned with budgeting, Waller's article quotes some sound advice to be applied by the librarian charged with this responsibility:

> The idea that a manager should be conscious of exactly what he is doing while he is managing may not sound revolutionary, but the fact is that such management is seldom found.... The absence of conscious, systematic problem analysis and decision making is not only responsible for inefficiency and waste; it is also responsible, in large part, for the general neglect of two of the most important management functions: the setting of clear objectives and the setting of clear performance standards (158, p.56-7).

Frohlick's article concerns itself with budgeting for hospital libraries and the need to relate it to the institutional goals is stressed (159).

Brodman's analysis of the problems confronting health sciences librarians, including budget cuts, is important despite the fact that we are faced with enough dire forecasts these days. It may be that she has put her finger on what will soon be a far reaching alteration in the way in which information services are provided:

> For that reason and also because we are not going to be able in the near future to offer so many 'free' services, I believe we must now put charges on more of the things that we do (160, p.90).

And in another article, she notes that a result of this will mean that:

> Obviously, managerial skills and a knowledge of cost accounting will become even more important in this decade than they have been in the past, and some way of considering the hitherto unaccounted for costs must be considered (161, p.583).

In this same light, two other papers are relevant. Lutz's article is a thorough discussion of various means of costing information services (162), and Cheshier discusses the application of a fee structure within a medical library network (163).

Articles dealing with quantitative approaches to specific areas of library operation are also present in the literature of medical librarianship. Two such examples are: 1 - "Cost-performance analysis of TWX-mediated interlibrary loans in a medium-size medical center library," (164) and 2 - "Unit costs of interlibrary loans and photocopies at a regional medical library." (165). A highly useful article for determining unit costs (outside the literature of medical librarianship) was published by Kountz (166).

The Future - That an effort is being made to confront some of the problems associated with administration is clear from at least two recent educational ventures. One is a program established at Case Western Reserve involving the resources of the School of Library Science and the Department of Operations Research (167). The result will be an individual with a double master's degree in both disciplines. I predict that the job prospects for these graduates will be quite bright.

For the profession at large, continuing education in the form of a Management Institute is being offered. Although largely problem- and

practice-oriented (judging from its description (168),(169)), the topics covered in this part of this review could be incorporated--if they are not already covered.

Summary

If the literature can be used as a yardstick, it appears that health sciences librarians may be lagging behind their counterparts in other fields of librarianship (particularly academic), with regard to the area of personnel administration. This is most noticeable for a subject of increasing importance--participatory management.

Health sciences librarians seem to have kept pace in the application of the principles of scientific management, but it may be that only a few individuals are, in fact, following along these lines.

The ramifications for continuing education programs are obvious. The Management Institute is a sound idea, but how many can be reached by this method? How many need to be reached? Well, judging from the number of humanities majors attracted to health sciences librarianship, (as to all types of librarianship), a goodly number.

It seems almost absurd to talk about continuing education ventures aimed at providing a basic understanding of mathematics and stressing their application to library practices, but this seems to be exactly what is needed. And, although implicit in the above, a similar need exists for the use of statistical tests on library data.

In the area of human relations, much needs to be done, but the paths a continuing education program should follow are not nearly so clearly marked. Do we need to concentrate on awareness of administrative theory and practice? I think so. Do we need to concentrate on change? Probably yes, but awareness comes first. Effective methods of change are not yet

well understood or generally applicable, so before we adopt a strategy (sensitivity training, for example), let us first understand the problem.

4 - Information Retrieval Systems/Information Science

Of primary concern in this topic, (if I interpret the library directors from the HUMRRO study correctly), is the effective use of information storage and retrieval systems available to health sciences libraries. This part of the review, therefore, centers on the development of MEDLARS principally, and other information services secondarily.

Pendrill devotes considerable space to MEDLARS and it is at that point in time that the idea of decentralizing the demand search capabilities was in bloom. By the time of Bishop's review "the initial phase of MEDLARS II is just around the corner...." (2, p.49). The problems associated with many of the decentralized attempts are indicated. And the evaluation of the demand search service "probably its most 'popular' aspect...." (2, p.49) by Lancaster had been completed. Based on this evaluation, quality control was built into the system (170).

MEDLARS is also discussed by Leiter at the Third International Congress of Medical Librarianship (171, p.155-65). Other articles concerning the demand search program were published, such as the one by Gomes (172), on the characteristics of users for one of the regional medical libraries. Another by Goode compared the retrieval of MEDLARS and Excerpta Medica on epilepsy literature (173). Again, the large number of citations (some 1500) not found in both searches should cause a high degree of frustration and unrest for the reference librarian.

The next stage of development involved the successful AIM-TWX experiment employing the services of System Development Corporation. A discussion of the background for this system appeared in McCarn's articles, (174),(175).

Again the inventive mind of Lancaster was called in to evaluate the system. Procedures born in the Cranfield studies and developed in MEDLARS evaluation could apparently be applied to printed versions of the retrieval systems (176), and also to on-line retrieval systems (113).

From the evaluation of AIM-TWX came the finding that the degree of training in the use, and an understanding of the system, were important in terms of its utilization. To realize the full potential of the system seemed to insure that reference librarians would not be among the unemployed--at least not immediately.

Other evaluations of the AIM-TWX service were conducted, notably by Moll (177), (178). Based on these studies, Moll makes some predictions:

> The auspicious beginnings of AIM-TWX augur well for the new era of MEDLINE (MEDLARS On Line) which will soon be the accepted method of retrieving and compiling bibliographical data on biomedical subjects (178, p.574).

As with other on-line data bases, the possibility for multiple use of the data soon appears to the inventive mind. Such was the case with the service devised by Blase and Stock to disseminate cancer information based in part on on-line searches (179).

The LT issue delegates the topic of treating the current stage of this development to Rogers (61). He outlines the technological advances that have occurred in the few short years between Bishop's review and his own commentary, that have made the on-line development of MEDLARS possible:

1 - third-generation computers;
2 - the advent of very large and fast disk drives such as the IBM 3330, with a capacity of 100 million characters for each drive;
3 - the availability of cheap terminals, with hardcopy printout to speeds of thirty characters per second, which now cost about $2,800; and
4 - the creation of reliable long-line communication networks with reasonable tariffs (61, p.78).

Thus, MEDLINE (MEDLARS On Line) became operational on a centralized NLM computer in October of 1971. "By July 1973 there were 163 operational MEDLINE units in the United States in addition to those at NLM...." (61, p.79). This number has obviously grown since that time, and the data base has become available through other avenues, most important being the State University of New York (SUNY) Biomedical Communication Network. Because the NLM and SUNY differ in many respects, a comparative study was undertaken by Spiegel and Crager (180). The MEDLINE data base has also become available commercially through SDC. This will undoubtedly have some bearing on future access and use of the journal resources of health sciences libraries.

Even though it is a fairly new approach to the retrieval of information, MEDLINE has already resulted in several studies. Moll evaluated the service also, and the possibility of fee schedule (now a reality) was introduced:

> Inasmuch as some of the 'yes' responses included certain mental reservations, it seems fair to conclude that approximately one-fourth of the users are likely to use MEDLINE less if a charge is involved (181, p.2).

McCarthy and others evaluated MEDLINE by a brief questionnaire survey of 350 users (182). The positive acceptance of the service and the willingness to pay were satisfying outcomes. A lack of knowledge of related services, such as SDILINE is not surprising based on the reviewer's own research (183). A comparison of MEDLINE searches and manual searches for a hospital community was followed by a questionnaire survey by Foreman and others (184). Respondents apparently did delegate the search and subsequent evaluation of the retrieved citations to the health sciences librarian, and MEDLINE could be effective as the primary search tool.

An interesting, but largely ineffective (this reviewer feels--see also Rogers (61)), approach to user education is embodied in MEDLEARN (185).

This is a teaching program to help members of the biomedical community become competent MEDLINE searchers. It is offered in both an interactive on-line mode and in a hard copy manual, and is available for use by other centers.

MEDLINE is here to stay and it will continue to improve, perhaps to the point that its progeny will be different than anything we can imagine today. Still a sound practical founding in the principles underlying the hardware and software of this system are necessary as a basic part of every health sciences librarian's storage of knowledge. A practical appreciation for this and similar systems must also be conveyed to the profession and, as usual, Rogers recognizes that a few remarks gained from experience may go a long way toward improving the understanding of a system. Accordingly, a case study of his "day in the life of a search-analyst" reveals the continuing (and everlasting?) importance of the human intermediary.

For a good "primer" approach to searching machine readable data bases, see the article by Williams (186). Other papers presented at this National Library Week symposium are also of interest (187).

MEDLARS II

MEDLARS II seems to have been largely realized to date thanks to MEDLINE and its successes, and despite the ill-fated and abortive attempt first made to move from MEDLARS I to MEDLARS II (188). A veritable cornucopia of on-line, interactive data bases is now available over inexpensive voice-grade lines, through a piece of equipment as simple, dependable, and antiquated as a TWX terminal. More sophisticated terminals are, and will be, employed. These data bases are growing at an unprecedented rate

but as of last count those available included: MEDLINE, CATLINE, SERLINE, BACKFILE, CANCERLINE, TOXLINE, CHEMLINE, COMPFILE, and SDILINE.

Other Sources of Information

As in the earlier reviews, services other than those provided by the NLM are of extreme importance to biomedical librarians. Bishop discusses current developments of BIOSIS, CAS, ISI, and the Excerpta Medica Foundation and the move to provide machine readable data bases on magnetic tape. Some of these same developments are described by Gillespie (189). The citation indexing approach was treated by Garfield at the Third Congress (190). Rogers in LT brings the picture up to date with the addition of CAIN, ERIC, and Pandex. His discussion of the American Chemical Society illustrates a point that is not well understood by many librarians regarding most data bases:

> CAS leases these tapes to users, but does not provide search services from its own shop. (61, p.76)

And his description of the resulting process:

> What has developed over the last few years is a distinct trend away from single-institution proprietorship of these tape data bases and toward a grouping of several data bases in what amounts to regional processing centers, supported by NSF grants. (p.77).

Also present, and perhaps of even more importance now, are the commercial services supplying on-line access to a variety of these data bases. The role of this middleman will have an impact on the fee structure that creators of the data bases devise.

EARS is the Epilepsy Abstracts Retrieval System and is of interest to health sciences librarians. It has been described by Caponio and others (191) and by Porter and others (192).

Drug Information Programs

This is an area in which the provision of information is of the utmost importance, but until recently, bibliographic control has been inadequate. For a background to the problems and attempts at such control see Bishop (2,p.77-9). Most remedial efforts have attempted to provide up-to-date, authoritative drug information. In some cases, drug information centers have become part of the medical library operation. (193) In others, these services are provided by some agency outside with the library serving as a switching center (56, p.113).

In a study by Windsor (194), literature was examined to determine to what extent published literature was available for 30 drugs prior to the first report of a human receiving the drug. The median number of prior publications was two. The importance of these few first reports before human use of a drug, necessitates bibliographic control which mades 100% recall possible.

A comparison of drug literature coverage between Index Medicus and Drug Literature Index was made by Wilkinson and Hollander (195). Again the degree of duplication for citations was exceedingly low--only 16%. Another study involving several secondary publications is reported by Montgomery (196).

For a comprehensive treatment of the information problem from the industry's point of view see the article by Starker (197).

One attempt at provision of information through on-line data bases has been the system of the Toxicology Information Program of the NLM called TOXICON, but changed to TOXLINE in 1973. The service provides access on a subscriber basis to a data base on hazardous compounds; chemical, physical, and biological properties of compounds; toxicity ratings; therapy of poisoning; precautions; etc. The files that may be accessed are described

in the Bulletin. (198)

For an explanation of the program of the American Academy of Clinical Toxicology to provide current awareness on, "(1) the clinical management of toxic effects, and (2) evaluation of the clinical merit of the publication... rather than just reporting of content." see the article in Clinical Toxicology (199).

The provision of drug related information is obviously a responsibility of the health sciences librarian. The problems arise when we speak of up-to-date, comprehensive, and authoritative information. It is apparent that this takes a specialist. Whether the specialist is hired by the library or some other part of the organization seems immaterial. What is important is that the full resources of the library be available and coordinated with any drug information program. Continuing education can be of benefit in planning for the establishment of what may be considered a specialized information service in this area.

Information Centers

The establishment of specialized information centers seems not to have progressed much since the NINDS program described by Bishop (2,p.60). In fact, if anything it may have regressed as noted by Darling, "The clamor of the early 1960s for specialized information centers federally supported has faded considerably." (15, p.57) However, literature concerning such operations has appeared and two articles by Eichhorn and Reinecke describe the operation of the Vision Information Center at the Countway Library of Medicine (200)(201).

An interesting example of a state funded information center is described by Minter with the establishment of the Tobacco and Health Information Services which operates as a "quasi-independent unit of the Medical Center Library (202).

The possibilities for health sciences librarians to establish such specialized services geared to local or regional interests or programs seem almost endless. However, it will require the librarian's skills, plus subject competency, and a good deal of public relations. Whether or not continuing education programs can respond to these needs remains to be seen.

Systems Analysis

This is a subject that could easily have been included under topic 3 dealing with Administration. It is closely tied to operations research and may be thought of in the more traditional sense of "good management." It is not something new, but the terminology is new and emphasizes a vitalistic approach to the analysis of library operations. This is an approach in which all things are related and the sub-systems act and interact with each other and with the total library environment.

In both the evaluation of a system and in system design, systems analysis is a sound, data-bound methodology to employ. For a fairly comprehensive treatment of the subject, see Library Trends, April, 1973. (203) Many articles deal with the subject and one good explanation is offered by Liston (204).

Systems analysis is a topic that deserves consideration for purposes of continuing education, but it might be more profitable if the systems approach could be incorporated into the treatment of those subjects where systems analysis would be most beneficial; i.e., the evaluation of on-line systems, the design of a serials control system, etc.

Selective Dissemination of Information

Some SDI services have already been mentioned and the topic will only be introduced at this point. Much has been written on current awareness services and the provision of information prior to a specific request for that information. An excellent starting point is the recent article by Swanson (205), which provides a theoretical background and a model system.

SDI is not included in Pendrill's review, but Bishop notes a study which indicates that the advent of computers for such services should make current awareness more democratic. The many systems in use up until that time could accommodate only a few users, often based on ability to pay.

Manual systems are still of interest and are the stock in trade of many health sciences librarians. Matheson describes a study based on user reaction to a system employing Current Contents backed by the provision of photocopies of articles which the user determines to be relevant. A user survey showed wide support for the continuation of the service (206). For background information on the program, see her article in the Third Congress(207).

Another manual system for the same institution is described by Yunis (based on monthly issues of Index Medicus). This system is compared to Current Contents and a majority (60%) preferred Index Medicus. The two used together seem to provide the best service (208).

A rather unique system was in use at the Virginia Medical Information System and is discussed by Lodico (209). Referral letters from doctors to the state were made available to the library and appropriate references were then brought to the referring doctor's attention. A free photocopy service

then backed the citation aspect of the program. Requests for articles were not high (12.5%), but many obtained references locally (22%). The service was generally well received.

Wood and Seeds describe a comparative study of a manual system and one employing NLM's SDILINE. A questionnaire survey indicated that both systems were well received, but that there was a strong preference for the SDILINE system (210).

That such services do respond to an important information need is clear, but how to best provide them is still unanswered. A knowledge of the function of information and the way in which it is obtained and used is essential to the practicing health sciences librarian.

Summary

The treatment of topic 4 has been concerned primarily with the state of the art in terms of some of the available information storage and retrieval systems. The most important, of course, is MEDLINE and its related MEDLARS II data bases. But from the standpoint of bringing the health sciences librarian to a point of awareness, it is the concept of on-line, interactive sources of information that are being emphasized.

Some of the services discussed have immediate applicability. Others indicate areas that require further study and development, but above all, they require an awareness of their potential by the librarian. The many aspects of information science have not been stressed here, but they certainly apply--notably systems analysis.

Although not many health sciences librarians will be functioning within a specialized information center, such a specialized approach can be applied to many internal information operations within even the smallest of libraries. One such application involves developing some type of SDI

system. The provision of such a service, even on a small scale, is highly important in fulfilling an information need common to virtually all users of literature.

In terms of continuing education, two types of knowledge need to be acquired: 1 - an awareness and understanding of existing and developing sources of information largely through on-line data bases; and 2 - theory and practical techniques in the control and dissemination of information based on the needs of a well-defined body of users, including the evaluation of information systems. For this second area, subject competency may be a requirement.

5 - Content/Subject Matter Expertise

This subject will be treated only briefly. There is not much in the literature other than that which has already been cited. There is virtually nothing on the "negative" side of the issue. To say that special librarians such as health sciences librarians do not need to have subject competency would be blasphemy. However, such is evidently the case.

The Manpower Survey indicated the number of humanities majors in health sciences libraries, and certainly most of them probably do a very adequate job. How they make up for their deficiencies in the subject area is not clear. The study showed that in ranking continuing education opportunities, the need for scientific terminology ranked considerably higher among nonprofessionals than among professionals (23). This lack of subject knowledge bothers many people, and well it should. However, there are some things to be said in addition to Kronick's remarks:

> It is clear that there is a great need for extended continuing education programs. No professional group can hope to maintain a level of competence and social relevance without such programs. The data do clearly demonstrate a need to orient some of the continuing education programs around the subject matter with which the literature of the health sciences is concerned (26).

This reviewer couldn't agree more, but it should be added that the problem is quite complex. Like so many other questions that can't be answered--how much is enough? Subjectively, it appears that more and more people with undergraduate degrees in one of the sciences or highly relevant social sciences are seeking employment as health sciences librarians. Should this be the case, it is simply a matter of evolution, with administrators building more subject-competent staffs. But the real question may be whether or not an undergraduate degree in any of these subjects is sufficient to operate in the current and future information environment. Probably not, but until the shortage of personnel in the health sciences,

particularly medicine and dentistry, is overcome, we cannot expect to find a large number of eligible employees with advanced degrees in suitable biomedical specialties. Fortunate are the few health sciences librarians who have obtained an M.D. and and M.L.S. and even more fortunate are their patrons, but the day when we may require both for positions in health sciences libraries cannot be foreseen and may never come. And in this same regard, is this the best mix for all positions in the library from administrator to reference librarian or only for some positions. The LEM Statement seems to say "no" to the former proposition On the other hand, law librarians are attempting, quite successfully, to achieve just this very end for the position of chief administrator of a law school library.

The reviewer is not in a position to provide definitive answers to these questions. I echo Kronick in his call for remedial action to obviate some of the shortcomings of the workforce we presently have. Continuing education can be provided in these subject areas in a variety of ways, but it appears that some type of synthesis at different levels of difficulty should be developed. If individuals approach this from a traditional academic program, the process may be too slow and a synthesis of knowledge never achieved. Therefore, I would propose offerings (whether course, programmed text, or whatever), purposely designed to synthesize the multiplicity of disciplinary knowledge involving various levels of difficulty, with the objective of increasing the individual's subject competency. This same approach can be pursued in some of the other areas that represent deficiencies such as quantitative analysis.

Summary

The question of subject area competency for health sciences librarians has been debated for years. The desirability of this is not denied, however,

the degree and the necessity of such competency for many library positions is questioned. A program offering various levels of competency, providing a multi-disciplinary approach, and designed especially with regard to the characteristics of the current workforce is suggested.

6 - Reference/Bibliography

This is a category closely related to the one on Information Retrieval Systems, but it was identified as distinct by many of the library directors. Here I propose to introduce some of the innovative approaches that are appearing, and changes that may have an important affect on the provision of reference services in health sciences libraries.

Pendrill observes that, "It is surprising how little attention this important topic /Reference Work/ receives in the literature." (1, p.79), and Bishop seconds it (2). Pendrill notes some important user studies that had been conducted, but the services mentioned are traditional.

Bishop too, mentions user studies, but includes topics that have already been treated in an early section of this review.

Lorenzi's article appropriately entitled "New information transfer therapies" in LT (56), provides an excellent picture of what the reference function is and is becoming. We will probably always have need for traditional reference services based on the provision of isolated facts (directory- dictionary-type questions) and the retrieval of documents or document surrogates that contain the desired information. However, the techniques are already beginning to vary, and if subject competency becomes a reality, perhaps we can envision the provision of information, thereby eliminating much of the current user effort.

New Approaches to the Provision of Information

As a starting point or benchmark for medical school libraries and the provision of services, the results of the Orr survey should be consulted (211). As a summary:

> The means for six service categories constitute a profile of services in the U.S. academic medical libraries as a whole.

> This national service profile shows that document, answer, and facility services are generally well developed, both relative to optimal library and relative toother service categories; whereas, instruction and consultation, and adjunct services, are generally poorly developed (211, p.475).

Lorenzi mentions the Alabama Medical Information Service via Telephone to provide person-to-person consultation for Alabama medical practitioners and the information transfer mechanism of the Drug Information Program at the University of Kentucky Library (56).

Two papers relating to reference work were presented at the Third Congress. The one by Flores de Hartmann recognizes many of the communication problems confronting the librarian and patron and emphasizes the interpersonal aspects of reference work (212). Adkins describes a system employed to handle many of the problems associated with the use of eponyms and the first descriptions of new syndromes (213).

More recently, Algermissen describes the program at the Kansas City School of Medicine where biomedial librarians are part of a docent unit and have evolved three approaches to providing patient-oriented and current awareness services. In the most innovative approach (LATCH), the Clinical Medical Librarian (CML) is present each morning at house staff rounds. The planned evaluation and testing of four hypotheses, particularly regarding the CML will be of future interest (214).

Beginning in June of 1974, a new feature was introduced into MLA News called "New roles for health sciences librarians." These may indicate areas of possible development regarding reference work.

What is the health sciences librarian's role in patient education? The American Hospital Association's General Council has approved a statement that identifies the health sciences library as a major potential resource for such programs. If implemented, the potential user population of the

hospital library will be greatly increased and the collection will have to reflect the needs of these new patrons (215).

The service known as LATCH is examined in the July 1974 issue of MLA News (216), which brings patient-oriented information directly to the patient-care team, but does not depend on the CML-rounds approach employed by Algermissen (214).

In line with the patient education function, an audiovisual library is described in MLA News (217), that does serve the patients of a medical center. In this case, potential user population has been expanded to the community. Another form of community "outreach program" appears in the December 1974 issue (218).

Finally, the idea of "clinical librarians" is again treated in MLA News (219). The experimental program at the University of Connecticut Health Center is funded by the U.S. Public Health Service and will run two years. Hopefully, after several of these clinical approaches have been tried, we will be able to test their effectiveness--inproved patient care--and evaluate the best qualifications and training for a clinical medical librarian. The development of similar programs and their implementation could be the subjects for continuing education planning.

User Studies

An important part of providing reference services is basing those services on the needs of the potential users of the library. Any study that provides information concerning users and sources of information thus contributes to effective planning. Many user studies were discovered in the literature covered by this review and some of these have already been cited. Some of the others will be briefly noted.

At the Third Congress, Olson presented a paper on many variables relating to users of health sciences libraries (220). Orr also provides the results of the national survey with standardized tests and gives document delivery capabilities of major biomedical libraries. This is a user study of libraries, but is valuable as a discussion of the problems associated with surveys (156).

Some of the studies identified were concerned with the problem of access to information by users. Williams and Pings (221) attempted to determine service performance levels for hospital libraries based on the makeup of the collection. Employing a citation approach to the problem, several interesting conclusions on providing access based on date of journal files and indexing and abstracting services are presented. Another study by Pings and Malin dealt with access to the scholarly record by physicians without academi. institution affiliation. Sixty percent of those studied did not have dependable access to library resources (222). An interesting study aimed at overcoming just the sort of inequity noted by Pings was conducted by Gillette and others and involved the use of local public libraries in switching requests and materials to the School of Medicine Library (223).

Other studies have dealt with the use made of library resources, and one by Oseasohn analyzed borrowing patterns by urban physicians. The very limited use noted is of serious concern, especially when trying to determine the quality of health care being provided (224).

Several studies have been conducted with regard to the journal collection. A citation analysis was used by Ash to determine an optimal journal collection in public health (225). Tibbetts reports on a method of estimating the in-house use of journals, a problem that has confronted

those concerned with collection use for a long time. For those determining circulation policies and storage criteria, such studies are highly informative (226). Closely related to journal use is journal availability. This is reported on by Piternick and 370 cases of failure in a 12-day period are analyzed (227). Finally, Smith's study looked at several aspects: circulation, reading room use, and interlibrary loan. Her findings are supportive of other studies in these areas (228).

Two final papers are concerned with special aspects relating to the availability of information. One, a study of "fugitive" papers by Meakin and Lewis, was presented at the Third Congress (229). Eight conferences were analyzed and the fate of the papers presented is noted. Another study by Yokote and Utterback deals with the time lag between manuscript submission and publication in comparing specialty core journals and those in general medicine. Some conclusions about the importance of this on invisible college are noted (230).

User studies must be the basis for the planning and design of information services and products. They are also essential in evaluating the performance of a health science library. The ability to plan and execute an effective study is a possible avenue to be explored in consideration of a continuing education program.

Library Use

Reference work may also involve providing instruction in library use for the patron, and the very important aspect of bringing information services and products and the user together.

Titley describes a course offered to medical students and makes note of a fact that is too often overlooked in planning such ventures:

> It is more effective to teach a fifth or a half of a class who want to learn than to teach all of the class with a number who are not interested (231).

A course for dental students is described by Dannenberg structured around planned seminars and student projects (232).

Library orientation is the subject of a paper by Eaton and two devices employing audio tapes are explained (233). A noncredit course for allied health personnel is covered in a paper by Borda and Murray (234).

Another teaching effort is described by Lunin and Catlin who have had considerable experience in this sort of venture (235). An important part of this approach was the utilization of the faculty in organizing, planning the content, and participating in the course.

The effectiveness of library instruction has rightfully been questioned, but in any event, health sciences librarians are not part of a mystic cult guarding the temple secrets from the outsider. If patrons want to learn the principles of information storage and retrieval, then we should be only too glad to teach them. On the other hand, we all have our own tasks to perform. As librarians we should be better able to provide for an individual's requirements than the individual himself. In turn, he should pursue his area of expertise, making use of information--not searching for information. We now have a labor supply sufficient to invoke the ideal embodied in maximum service. Let us find a way to fund the positions to realize this ideal.

Bringing the User and Information Products and Services Together

This is an extremely important area for the simple fact that no information product or service can fulfill its intended function unless potential users are aware of the product or service and possess the details required to avail themselves of that product or service. A novel and informative

means of publicizing the library is discussed in an article by Bell and Davis (236).

Little attention has been paid to this aspect of library operations in the past, but its importance will become more significant as fees for certain library services become commonplace. On a higher plane, the value of what we have to offer depends on reaching all those who have a need for our services--not just those who are already library and information users.

Summary

This section has dealt briefly with the provision of reference services, particularly some new and innovative approaches. User studies were also examined as the basis for planning and evaluating these services. Finally, the problem of bringing users and services together was indicated.

All of these areas are important in planning for continuing education programs. Each area is linked to the others. A service that is not based on user's needs may not be used. One that is based on such needs may not be used because potential users are not aware of it. And a service may be overused by successfully bringing user and service together, when it was not planned that full utilization should occur. If everyone who had a need for MEDLINE were to attempt to utilize the system, it would break down from sheer overload.

Theories and techniques applicable to each of these areas are available--continuing education programs could bring them together with those who have need for them--health sciences librarians.

CONCLUSIONS AND RECOMMENDATIONS

This review has examined some of the literature of medical librarianship for the years 1970-74. In addition, literature from librarianship in general, and a small quantity from other areas, was given what can only be described as cursory treatment. These sources were compared with three reviews covering the period from 1961 to 1973: 1) Pendrill; 2) Bishop; and 3) Library Trends, July 1974. It was assumed that this comparison would reveal changes in the skill and knowledge requirements for health sciences librarians. Assumptions about the relatively short half life of a librarian's professional education would appear to be substantiated by the changes that have taken place with regard to the six topics investigated.

Several studies were noted in the first section of this report that dealt with the subject of continuing education for health sciences librarians. Several of these provided a broad consensus of opinion by librarians concerning deficiencies that might be corrected through the development of a continuing education program. The six topics mentioned most often by the directors of medical libraries as areas needing attention were discussed in detail in light of the reviews and literature surveyed. These six topics were, in order of importance:

1 - Automation/Computer Applications
2 - Non-Book Materials/Multi-Media
3 - Administration/Management
4 - Information Retrieval Systems/Information Science
5 - Content/Subject Matter Expertise
6 - Reference/Bibliography

Some tentative suggestions regarding each of these areas will be discussed in light of the impact statements provided by the Delphi Committee in the HUMRRO Report. These impact statements relate to those events or predictions that had the highest probability of occurrence within the next few years. Before

this discussion, however, there are several areas and specific topics that did not find their way into the treatment of these six topics, but which are important to the profession and may be closely related to future continuing education needs.

Cooperation is an extremely important topic that has only received brief mention in this review. The development of the Regional Medical Library Program is well documented in the literature of the past five years. The key ingredient in such a program is not money, as one might imagine, but rather a recognition on the part of the health sciences librarians that institutional interests must now be viewed with regard for the other participants in the delivery of health sciences information. It is at the basic unit level of the RMLP hierachy that such cooperation is most urgently needed. A sharing of talents and resources seems imperative. The role for continuing education may be more one of awareness and understanding than anything else. The reviewer's limited experience in this area indicates that many health sciences librarians are not fully aware of the purpose of the RMLP or the part they are intended to play.

The Regional Medical Program is on a tenuous footing these days, but from last report, it seems to be moving ahead (237). Many library related programs are an important part of the RMP and much literature has discussed the role of the health sciences library in the program. Again, continuing education may be one way to insure that libraries become even more actively involved.

On a broader base, the proposed concept of a national network linking all types of libraries has been offered by the National Commission on Library and Information Science. As planned, this would have a direct impact on health sciences libraries. I join with Bishop (238) in calling on health sciences librarians to get involved and let NCLIS know that they haven't invented the "network." Again, the matter of cooperation is at the heart of their proposal. For a comprehensive treatment of networks, see Becker (239).

To go even further, even though this review is concerned with health sciences librarianship in the U.S., there are international areas of cooperation that should be receiving more attention in the literature. Again, it may be a matter for continuing education to place health sciences librarianship in this country in the proper world-wide perspective. We exist not only in conjunction with the RMP and the RMLP, but also with regard to the world-wide provision of health sciences information vis-a-vis the developing countries. A noticeable lack of published information regarding the World Health Organization in the health sciences literature seems to indicate a need in this area. As important is the international cooperative information system proposed as UNISIST (240). If not actively involved, we should at least be reading in our own literature how such developments may influence the future. Continuing education by means of the printed word is the very least that is being advocated here.

Hospital Libraries are "emerging" as noted by Pendrill, and they continue to do so. This is largely because of factors mentioned above with regard to program involvement and the need for cooperative approaches to the sharing of talents and resources. A great deal of the literature covered by this survey deals specifically with the hospital library. As provided for in the new certification code, some difference in continuing education needs of many hospital librarians appears to be required. In any program that is developed, it appears essential that in addition to the two major tracks embodied in the certification code, there be programs developed to relate to individual interests and to different levels of sophistication. In other words, a hospital librarian with an MLS should be able to participate in a beginning, intermediate, or advanced program dealing with Automation/Computer Applications for hospital libraries. Whether medical school librarians and hospital librarians continue to share the same professional organization, thereby providing what may be the

best forum for communication, or not, may well depend on the course of future continuing education programs.

Medical History is a topic that receives a lot of attention in the literature, but what its future will be in terms of the need for continuing education is not clear. One aspect, however, Oral History does provide for the capture of an irreplaceable resource. Some attention to this facet might be provided for through continuing education.

The National Library of Medicine and the recently extended Medical Library Assistance Act (241), provide the superstructure and mortar holding large segments of the biomedical communications network together (for the U.S. and the rest of the world). NLM's rise to eminence was noted by Pendrill and is still intact today. Any program of continuing education will have to be closely articulated with the goals and resources of the National Library of Medicine.

New Medical School Libraries are an important topic in their own right. Many have recently been built and others are planned. Several articles in the literature deal specifically with the problems faced by the library administrator in the construction of a new building to replace an existing one, and in the creation of an entirely new medical school from scratch. Hospital library construction has not been overlooked either. This subject could represent a need for a specific continuing education program or it might be a topic that could be made part of the objectives of an administrative unit in planning for continuing education.

Standardization should also be considered with regard to many of the areas discussed in this survey. Some important articles on the subject have appeared and should be noted by health sciences librarians (242-250). Any attempt to formulate performance criteria that can be applied to more than just one institution's goal attainment will require meaningful standards.

This, too, is a subject that is closely tied to administration of the health sciences library.

In passing, mention should be made of two additional areas involving bibliographic control: 1) translations, and 2) the National Libraries Task Force on Automation and Other Cooperative Services, and particularly, the National Serials Data Program (251). The area of translations seems about as muddled as ever. A national machine readable data base for scientific serials would probably prompt changes in cataloging, serials control, and inter-library loan for many health sciences libraries.

All of these additional topics have received some treatment in the literature covered by this survey. The importance of each with regard to the need for continuing education should be considered.

The HUMRRO Report in Retrospect

It might now be useful to go back to Table 2 on page 17 and again look at the events which the Delphi Committee listed as having a high probability of occurrence. None has an occurrence date later than 1980, and some were predicted for as early as 1976.

If there is any common bond between all of these events and the impact they will have on health sciences librarianship, it is certainly the educational requirements associated with each. Time after time, there is an emphasis on increased subject competence in health sciences subjects and a need for greater knowledge concerning information science; administrative skills; and educational research, theory, and practice. Coupled to these high probability events is the recurring theme that health sciences librarians are going to have to become specialists in many fields which are already familiar to them, as well as, in may fields that are foreign to them.

If the predicted events do occur, then continuing education will undoubtedly play an integral part in the reshaping of the knowledge and skills of the workforce. However, before any revolutionary migration of health sciences librarians to positions now held by systems analysts, educational and media specialists, and communications personnel can occur, certain remedial steps need to be taken to insure that the practicing health sciences librarian of today has the necessary knowledge and skills to effectively fuflill his immediate role. It appears that despite long and serious attempts by the MLA to provide for the continuing education needs of its members, such has not been possible to the extent necessary. That continuing education is needed and that enlarged programs must be forthcoming, has, one hopes, been amply demonstrated.

Recommendations

Unlike Allen (5), I do not propose to set forth a pedagogical approach to the solution of the continuing education problem. Instead I hope to offer some specific suggestions that might be considered in designing a continuing education program for each of the six areas treated individually in this report. But before doing this, a few general comments about such a program are offered.

We must, I feel, recognize that continuing education applies to the supportive staff as well as to the professional stafff in health sciences libraries. Regardless of how you differentiate between the two categories in actual practice, the knowledge and skills of the first professional library degree must form the base on which one track is established. This track (or perhaps avenue is a better word) allows a program to build on that assumed knowledge base. For the other track there are different assumptions about prior knowledge and skills. As mentioned earlier, it must be possible to move from

track to track depending on the skill and knowledge of the individual, and the first professional degree is not the only way to acquire the base on which that particular track builds.

Next, for each track there may be different levels of difficulty involved with the continuing education program. These levels may require further basic competencies built on the attainment of the skill and knowledge provided at lower levels in the track. In addition to different levels of difficulty from beginning to advanced and even to theoretical, there must be an orientation toward the type of library interest of the individual or toward the functional interest of the individual. For example, a program for the health sciences librarian in a community hospital setting (or directed towards some aspect of reference work, or serials work, or administration in that type of library) will go farther towards fulfilling that particular individual's needs than a program designed to treat health sciences libraries and librarianship in general with the responsibility of adapting it to a particular setting or function left to the individual.

Finally, continuing education programs must be constantly evaluated and changed as required by the library's changing environment. At the present, continuing education is probably one of the most important issues in librarianship. Unfortunately, with inflation, the energy crisis, and the general cry for accountability, money for such programs may be tighter than it has ever been before. Partially as a result of this, but also because it would be desirable in any event, continuing education programs must be designed for delivery by a variety of means. It is nice to be able to take advantage of such opportunities at annual and regional meetings, but often those most in need are least able to take advantage of such opportunities. I would

personally like to see more programs planned for delivery to a group of local libraries or within a specific library. Too long (or at least to too great an extent) we have been sending people out of the library and out of the community to pursue their continuing education programs (with regard to at least one important type of continuing education program). If more programs were planned for local delivery, then more of the staff could be reached and programs could be more easily tailored to the interests of the individual library and its employees.

1 - Automation/Computer Applications - For the time covered by this review, this area has seen the move from experimental batch mode operations to on-line operational applications, even to the extent of mini-computer utilization. This is clearly an important subject area and one in which different levels of sophistication are certainly needed. It appears that computer applications will continue to progress and any continuing education program should take this into account and have a high degree of adaptability built into it.

2 - Non-Book Materials/Multi-Media - This area probably represents an even more fluid if not chaotic picture than the one above. This may be due to the fact that we were further behind in this area. There is some question whether or not we even knew this area existed. However, despite our slow start, we are closing rapidly. We are making noticeable strides in hardware and software control, but the ideal is far from realized. The biomedical communications network is functioning and evolving, and the audiovisual component is alive and well. Computer assisted instruction is making itself felt although still a toy for many. Again, the variance in sophistication among health sciences librarians underscores the need for flexibility in any continuing education approach.

3 - Administration/Management - A couple of good things appear to be happening with regard to this topic; namely, educational programs, and continuing educational opportunities. Judging from the lack of literature on the topic, awareness of the problems may be lacking. If such is the case, it is largely a matter of self-definition and basic education in the areas of human relations and scientific management. Once these deficiencies are overcome, we may be ready for the more difficult task of organizational change.

4 - Information Retrieval Systems/ Information Science - Just trying to keep up with the on-line data bases that seem to be developing daily is a task facing most health sciences librarians. For the even more important tasks of systems design and evaluation, we are again faced with different levels of need. The design of a small manual SDI system for a few well-defined users is not the same thing as research and design of a national, on-line data base, but both are important and both are needed.

5 - Content/Subject Matter Expertise - This may be no more than a bugaboo, or it may be the key ingredient in the survival of the health sciences librarian. I will only venture to say that it will continue to receive attention from within and without the profession. Accordingly, I do feel that a program should be investigated that will provide a symbiotic approach to the subject disciplines represented. For most of those who have a need for improved subject competency, there is not enough time in which to acquire it by traditional methods. Some type of immersion process may be what is called for where the health sciences librarian is totally submerged in a well-balanced biomedical soup. The result is not an expert in any given discipline, but one who understands the terminology of many disciplines and can relate one to another.

6 - Reference/Bibliography - As noted by earlier reviewers, health

sciences librarians do not write much about what is undoubtedly their most important function--bringing the user and information together. Some user studies are reported, but one has the impression that more products and services are based on the intuitive approach than on factual data. Library instruction has received attention, but what about "selling" a product or service to the library's consituency? If library services were utilized by all those who have a need for them, could we survive? For application to a contiuing education program it appears that here again is an area in which we need to define the objectives of the library before we set about changing the way in which we attempt to accomplish these objectives. Perhaps many will not see the need for a theoretical approach to the reference function, but it is exactly our own lack of understanding of the basic aspects of the information transfer process that continues to plague us.

This report has attempted to document change within health sciences librarianship in the past 15 years. It was suggested that the half life of most health sciences librarians first professional degree was shrinking and that this necessitated the development of a well-planned continuing education program. It is the reviewer's contention that the case has been proven. A few suggestions have been tentatively offered. In conclusion---We know we need it, So let's get on with it--Remember, we are all in this together.

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APPENDIX A

Subject Heading List for Edge Notch Document File

ABRIDGED INDEX MEDICUS
ACQUISITIONS (see also Automation)
AIM-TWX
AUDIOVISUAL
AUTOMATION (see also specific subjects, i.e., acquisitions, serials, etc.)
AVLINE
BIBLIOGRAPHIC CONTROL (see also specific services, i.e., BIOSIS, CAS, etc.)
BIOSIS
CAI (see Programmed Instruction)
CAS
CANCERLINE
CATALOGING (see also Automation)
CATLINE
CIRCULATION (see also Automation)
CLASSIFICATION
CONTINUING EDUCATION
COOPERATION (Includes networks, RMLP, etc.)
COPYRIGHT
DRUG INFORMATION (Includes problems associated with)
EPILEPSY ABSTRACTS PROGRAM
EXCERPTA MEDICA
FOREIGN MEDICAL LIBRARIANSHIP
GOVERNMENT REPORTS (see Scientific Communication)
HOSPITAL LIBRARIES
INDEX MEDICUS
INDEXING
INFORMATION CENTERS
INNOVATION AND CHANGE
ISI
LIBRARY USE - EDUCATION (Includes formal instruction and interface programs)
LISTER HILL BIOMEDICAL COMMUNICATIONS NETWORK
LOSS OF MATERIALS
MANANGEMENT (Includes systems analysis, operations reesearch, personnel, etc.)
MANPOWER
MEDICAL EDUCATION
MEDICAL HISTORY
MEDICAL LIBRARIANSHIP (Education for, academic status, MLA, etc.)
MEDICAL LIBRARY CENTER OF NEW YORK
MEDICAL LIBRARIES (other than medical schools, i.e., nursing, dental, pharmacy, etc.)
MEDICAL SCHOOL LIBRARIES
MEDICAL TERMINOLOGY
MEDICAL WRITING (see also Scientific Communication)
MEDLARS
MEDLARS II
MEDLINE
NATIONAL LIBRARY OF MEDICINE (NLM)

NATIONAL MEDICAL AUDIOVISUAL CENTER (NMAC)
NATIONAL SERIALS DATA PROGRAM
NEW MEDICAL SCHOOL LIBRARIES
OHIO COLLEGE LIBRARY CENTER (OCLC)
PHOTOCOPYING
PREDICTIONS
PROGRAMMED INSTRUCTION (Includes Computer Assisted Instruction)
REFERENCE WORK (Includes Information Storage and Retrieval Systems, SDI,--for specific data base see under name, i.e., MEDLINE.)
REGIONAL MEDICAL LIBRARY PROGRAM (see also Cooperation) (RMLP)
REGIONAL MEDICAL PROGRAM (see also Cooperation) (RMP)
SCIENTIFIC COMMUNICATION
SELECTIVE DISSEMINATION OF INFORMATION (SDI)
SERIALS (see also Automation)
SERLINE
STANDARDS
SUNY BIOMEDICAL COMMUNICATIONS NETWORK
SYSTEM EVALUATION
TELEFACSIMILE
TOXLINE
TRANSLATIONS
USER STUDIES (Includes studies involving research methodology)
WORLD HEALTH ORGANIZATION (Includes other international cooperative ventures, i.e., UNISIST)